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ELEMENTARY PRINCIPLES OF MEDICINE.

Elementary Principles of Medicine.

The premature death which awaits so large a portion of the human race is in a great measure owing to disease; and Medicine is that science which determines the existence and nature, as well as the means of preventing and of curing this class of physical evils.

The causes of disease are of two descriptions, or general and specific. The *general* causes are mechanical or chemical injuries, atmospheric vicissitudes, errors in diet, and powerful moral impressions; and, out of a total of 338,979 deaths in England and Wales, in 1841, the number of persons who died from these causes was 273,636. The *specific* causes are morbid poisons, as that of small-pox, of typhus fever, of measles, of scarlatina, or other contagion; and the number of deaths which resulted from these causes, in 1841, in England and Wales, amounted to 65,343. As the diseases arising from these two different classes of causes are entirely opposed, both in their laws and treatment, it is intended to form them into two great divisions, or into diseases arising from general causes and into diseases arising from specific causes, and to make these the basis of the arrangement of the present treatise. The diseases arising from general causes, being far greater in number and much less complex in their phenomena than those depending on morbid poisons, are entitled to be first considered.

OF THE DISEASES ARISING FROM GENERAL CAUSES.

The number of diseases arising from the action of general causes appears to be immense; but, on a careful analysis, they resolve themselves into two great orders, or into diseases of function, and into diseases of structure (*morbi organici et simplices*), each embracing a small number of classes. The diseases of function, for instance, embrace the neuroses, hæmorrhages, and dropsies; while inflammation, tubercle, cancer, melanosis, hypertrophy, and atrophy, are the subordinate classes of the diseases of structure. It is proposed to treat of the various species of disease comprised in each class under the head of the particular class to which they belong, prefacing each order and each class with a short outline of its most general laws.

OF THE DISEASES OF FUNCTION.

The diseases of function embrace all those diseases in which the action, the secretion, or the sensation of a part is impaired, without any primary alteration of structure of the organ or tissue affected. Thus, mania, catalepsy, neuralgia, anæsthesia, and palsy, are neuroses of the brain or other portion of the nervous system. Colic, vomiting, diarrhœa, and constipation, are neuroses of the alimentary canal; and so on of other parts. Hæmorrhage, or the effusion of blood, and dropsies, or an effusion of water into the shut cavities of the body, as that of the head, chest, or abdomen, are other instances of functional disease. These two latter classes, however, are so extremely well marked in their phenomena, in whatever part of the body they may occur, that they seem to form each a distinct family; and, consequently, it appears more proper to treat each of them under a separate head.

Elementary Principles of Medicine.

No science can be understood without some reference to its elementary principles; and three systems have prevailed at different times to explain disease, or vitalism, solidism and humoralism. It seems probable, however, we must adopt the essential parts of all three systems in a sound philosophy of Medicine. Vitalism, for instance, supposes that a morbid state of the vital principle is the cause of disease. This may be questionable; but it is certain that this great principle differs, or has a different force, in childhood, in manhood, and in old age; and also that this force varies, not only at different periods of life, but in different seasons, and even in the same day and in the same hour, in the same person. Disease, therefore, can hardly be understood without taking this element into consideration; and the different phases and force of the vital principle, and the different modifications impressed upon it by social position, necessarily form the most leading feature in what are termed the *predisposing causes*, or the different degrees of liability of persons of different sex, age, profession, or habits, to fall into a given disease.

Besides a given state of the vital principle, a healthy condition of the solids and fluids (the *excitor* and *excited* forces of the body) is equally essential to health. Let us, for instance, divide the sciatic nerve, and all the parts below the division will have lost not only all sensation, but all power of motion; or if we suppose the divided nerve to supply an organ of secretion, that function is also destroyed. Thus, a division of the gastric branch of the eighth pair destroys digestion, while a similar operation on the pulmonary branches causes the animal shortly to die asphyxiated. It is equally demonstrable that any alteration in the proportions or physical properties of the blood, by modifying or rendering morbid one of the great exciting forces of nervous action, is equally a cause of disease. Thus, on injecting a quantity of water into the veins of an animal it falls into dropsy; the abstraction of a portion of fibrine causes inflammation; while the loss of any considerable portion of the red globules is well known to produce most marked debility. It seems determined, therefore, that any departure from a healthy state of the solids or fluids is equally the cause of disease; and hence the necessity of admitting the leading features of solidism and of humoralism, as well as of vitalism, as fundamental principles of Medicine. It will now, consequently, be necessary to point to a few of the more striking facts connected with these theories.

In the examples which have been given, demonstrating the influence of the solids in the production of disease, the nerve has been supposed to have suffered considerable mechanical injury; but it seems probable that the slightest change in the action of the nerve is sufficient greatly to modify the action as well as the secretion of the organ or part it supplies. Now the probable mode of action of a nerve is as follows:—

Anatomy has shown that the brain and nerves are fibrous; and a fibrous structure almost of necessity implies action or contraction. But, independent of this argument, there are many beautiful phenomena, especially of sight, which seem to prove that vision and sensation generally result from a physical action or contraction of the nerves, whether of the eye or other organ. Thus, if we look steadily at a target composed of concentric circles of various colours, placed in a strong light, till the sight is somewhat fatigued, and then close the eyes, shaded by the hand placed at about an inch distance, we shall see, says Darwin, the most beautiful circles that imagination can conceive, and which are most resembled when a drop or two of oil is poured on a still lake on a fine day. These circular irides of colour, however, are not only different from those of the target, but are perpetually changing till the eye recovers its usual passive state. These adventitious colours are called the reverse, or supplemental colours. This and similar facts show that vision is not owing to the mechanical impulse of light, or to its chemical combination with the nerves of the retina; for in those cases the spectra formed on the eye would remain of the same colour, only growing fainter and fainter, till they at last disappeared altogether. The probable explanation, therefore, of these phenomena seems to be, that the retina is composed of many sets of nervous fibres, and that when the set whose contractions, for instance, cause the sensation of red is fatigued, it is relieved by the action of an antagonist set whose contractions cause the sensation of green, in the same manner as we relieve the muscles of the arm by changing its position and bringing a different set of muscles into action. Another circumstance, also, which seems to demonstrate that the contraction of the nerves constitutes vision, is, if we press the ball of the eye at its external angle a luminous appearance is observed; while, if the eye be struck a smart blow, we all know flashes of fire are perceived. Now, the sensation of fire thus produced is entirely the result of mechanical causes, light or other natural stimulant being altogether absent. It follows, then, that vision is produced by contractions of the fibres of the optic nerve; and this mode of action, proved to be true of the sense of sight, may be equally demonstrated of the nerves of the other senses, and also of those of the different organs of secretion. It results, therefore, if a healthy action of the nerves (the great moving and secreting powers of the body) be essential to health, that every morbid action of the nerve must be a cause of disease.

The contraction of a nerve, however, although it may account for sensation and secretion, is hardly sufficient to explain the great power imparted to and exercised by the muscles; for if we consider how soft and tender and little coherent the brain and nervous fibres are, and also how easily the muscular fibre is torn after death, something more is wanting than mere muscular contraction to explain the infinitely greater power which the muscular fibre is capable of exciting during life than after death. Sir Isaac Newton was of opinion that the cohesion of bodies depends on the presence of elastic fluids; and this opinion is strengthened, if not completely established, by modern discoveries, for a continued stream of electric fluid will enable a magnet to support a mass of iron, of any weight, for an almost indefinite time. It seems probable, therefore, that nervous contraction is followed by the extrication of a fluid which is the cause of vital cohesion of parts, and of the wonderful force which the muscles exert in moving and raising bodies.

It is singular that the electric fluid, so powerful an agent in producing cohesion of inanimate substances, is also the great agent of chemical composition and of decomposition; and likewise that this fluid is evolved by mere change of motion in the particles of matter. It seems highly probable, therefore, from analogy, that a nervous fluid is extricated in like manner by a molecular motion or contraction of the nerves, and that this fluid is the cause, not only of nervous and muscular cohesion, but is also the great agent of the vital compositions and decompositions which are incessantly going on in every part of the body. Again, when we observe that heat is given off by most inorganic substances after a smart blow, which approximates their particles, we may almost infer that nervous contraction may be one of the means which nature employs to regulate the temperature of the body.

If the theory of a nervous contraction, followed by the extrication of a nervous fluid, be established, the one may be taken as the measure of the other, and the term "nervous sensibility" may be used to express their conjoint effect. This nervous sensibility, it would appear, then, in health, is accumulated by repose and exhausted by action; so that, at times, it may be considerably in excess or in defect. If, for instance, we sit in the dark, the sensibility of the retina is so greatly increased that the eye is actually pained by the admission of a strong light. On the contrary, if we look at the sun, the sensibility of the retina is so absolutely exhausted by the intensity of its rays, that for a time we are blinded to every other object. This property of accumulation and of exhaustion of nervous sensibility is often extremely sudden, or otherwise exists in a most marked degree in disease. Thus, nothing is frequently more unexpected in its attack than a paroxysm of wild insanity, of epilepsy, of hysteria, or of tetanus; while fainting, or the last stages of fever, are familiar examples of collapse, and of the rapidity with which the nervous energy is exhausted.

The hypothesis of a nervous fluid seems to lead to the inference that this elementary principle may be rapidly communicated from one part to another. In health, the action of the brain, in determining a greater quantity of nervous fluid to a particular part, is quite remarkable. Let a black spot, for instance, about the size of a tadpole, be made on a sheet of white paper; that spot, if looked at attentively, will be seen in a few seconds surrounded by an areola of light; a circumstance which can only arise from the retina being rendered more sensible by the increased quantity of nervous energy communicated to it from the brain by the power of attention. In like manner, it is well known that the times of the action of the bowels, the times of eating, and so on of the other functions, may in a considerable degree be accelerated or retarded in proportion as we direct our attention towards those purposes. It is this power of the brain over distant parts which renders the nervous and hypochondriacal person so prone to exacerbations and remissions; for, by constantly brooding over his complaint, a flood of cerebral or nervous energy is directed to the diseased part, and all its morbid sensibilities are immediately aroused. If we pursue this subject further, it will be easy to show that a powerful action of any one part may readily exhaust the whole system, terminating, perhaps, in almost sudden death. A person, for instance, has strangulated hernia, or a small ulcer of the intestine; the part is not vital, nor the pain great, yet in a few hours the patient lies a corpse.

It would be extremely difficult to exhaust the interesting subject of the action of the solids; but there are two points which it is essential to lay before the reader, as they instance remarkable laws of the neuroses. The first is, that sensation, though almost constantly *passive*, and in health only brought into action when some external agent is present capable of acting upon the nerve, yet is in some instances *active*, or exists when no external agent having any affinity for the nerve is present. Thus, we are often sensible of tastes in our mouths, although we have not eaten the particular substance, perhaps, for some months. In like manner, in insanity, the patient often hears and sees persons and things which have no real existence. Another familiar example of active sensation is, that persons who have lost a limb (as the leg), are often sensible of painful or agreeable sensations, which they refer to the foot, although that part has perhaps been long removed. In all these cases the sensation is evidently active, the nerve taking on those actions by which such sensations were accustomed to be transmitted to the brain. It is, perhaps, owing to this law that a part, having been once diseased, readily runs into the same morbid state, not only when the exciting cause is present, but also when it is absent.

The next remarkable law is, that sensation is not, as is generally imagined, instantaneous; but, like every other function, is performed in certain times. The sensation of sight, for instance, is not instantaneous, for we many times in an hour cover our eyes with our eye-lids without perceiving it, so that the perception of light is not changed for that of darkness in so short a time as the twinkling of an eye. On the continent it has been remarked, that different astronomers observing the passage of a star over the thread of a micrometer by the same clock have varied a third, a half, and even a whole second as to time—a discrepancy, says Nicolai, which can only be accounted for on the supposition of a difference of time in the transmission of the image of the star from the eye to the brain, and also of the sound of the clock from the ear to the same organ.

In disease, the times of the action of the brain are often greatly increased or diminished. In idiotcy, and other forms of insanity, and also after many other severe disorders, the apprehension of the patient is often distressingly slow, while in acute cases the patient will hardly sleep day or night for many weeks together from incessant activity of mind. Again, if we look to the other functions of life, as to defæcation or to digestion, we shall find that the organs on which they depend act only at certain times, long intervals of repose being necessary to renew their power after action. The stomach, for example, in the adult, can only digest three or four times a day, for if pressed beyond a given point food is loathed. In bulimia the appetite can hardly be satiated, while in fever the patient hardly digests anything for many days. The action of the bowels, also, instead of taking place every twenty-four hours, may be incessant, or it may be deferred for several days or even weeks. The law of healthy animal functions then is to remit; and when the natural times are disturbed, disease is the consequence. It is this tendency of diseased actions to remit which so often occasions a difficulty in determining whether the recovery of the patient is owing to medicine or to a natural subsidence of the disease, and it is to this cause we must attribute the endless "nostrums" which disgrace the practice of physic.

Such is the probable action and a few of the laws of the nerves in the neuroses. The few facts relating to the alterations of the blood in this class of disease with which we are acquainted are as follows:—Andral supposes the mean quantity of fibrine in healthy blood to be 3 parts in a thousand; of red globules to be 127; while of the solid contents of the serum, 71 parts are albumen and about 9 parts are free alkali, or other saline substances. Now if we take plethora and anemia to be the extreme points of the constitution in the neuroses, we shall find the natural and healthy proportions of the blood sensibly altered in these states. Thus, in thirty-one cases of well marked plethora, Andral found the proportions of fibrine diminished to 2·7 instead of 3, while the mean of the red globules was as 141 instead of 127. On the contrary, in sixteen slight cases of anemia the red globules were reduced from 127 to 109, while in twenty-four well marked cases the mean was only 65, and in one case they had fallen as low as 28. Again, the quantity of fibrine in the sixteen slight cases was natural, or as 3; while in the twenty-four well marked cases it was increased, or as 3·3. In general, then, in the neuroses the characteristic of the plethoric extreme of the blood is a less quantity of water and of fibrine, and an increased quantity of red globules; while in the anemic extreme the water and fibrine are increased, while the red globules, and probably also the albumen, are greatly diminished. The blood also in this latter state is sometimes slightly buffed, and the globules smaller than in health.

It is singular, in the neuroses the opposite extremes of plethora and of anemia are often marked by nearly the same symptoms as tinnitus aurium, vertigo, palpitation, and hysteria. The different states of the constitution, however, distinctly mark these opposite conditions.

Besides the symptoms common to plethora and anemia, Andral conceives he has determined a law peculiar to anemia, or that, when the red globules of the blood are below 80, the *bruit de diable* is constant, and heard in every artery in the body. When they are about 80 this *bruit* is still constant, but is heard only in the carotid arteries. Again, when the quantity of blood globules is above 80 and below 125, the *bruit*, though still heard in the carotids, is not constant but intermits; while above 125 he conceives the *bruit* ceases altogether.

The facts which have been mentioned will, it is hoped, turn the attention of the student, and awaken his curiosity to the great elementary principles of the Neuroses,—a class of disease usually of long duration, without fever, often strikingly formidable in their symptoms, and in many instances the cause of much suffering. They are generally difficult of cure, and it will be seen for the most part aggravated by bleeding, and assuaged by opiates and tonics, but under any circumstances have a strong tendency to recur.

ORDER I.

OF THE NEUROSES.—CLASS I.

Of Insanity.—Esquirol has defined madness to be a cerebral affection, ordinarily chronic, without fever, and characterized by disorders of the intellect, of volition, and of the senses. A moral as well as a pathological definition, however, is necessary of this disease, and in that view it may be defined to be that state of mind which renders a man an irresponsible being, and consequently unfits him for the performance of the social and political duties of life. The amount of disease necessary to constitute this state must often rest with a jury; for every faculty of the mind may be diseased, as the memory, the judgment, the imagination, and the power of associating ideas, yet the party may continue to be a most useful and even valuable member of the commonwealth.

The history of insanity shows that it is of very early origin. Saul was unquestionably insane; and so familiar does this disease appear to have been among the Jews, that David, to escape from Achish, king of Gath, feigned himself mad: "and he changed his behaviour before them, and feigned himself mad, and scrabbled on the doors of the gate, and let his spittle fall down his beard. Then Achish said unto his servants, 'You see the man is mad.'" The insanity of Hercules, of Ajax, of Medea, and of Orestes, must have been traditional before it became the subject of poetry, and shows that the disease was common even in the fabulous ages of the Grecian annals. In modern times it is a disease unhappily of frequent occurrence, and has, though perhaps erroneously, been supposed to be extended in proportion to the degree of civilization. The numbers that died from this complaint in England and Wales, in the year 1839, amounted, however, according to the Registrar-General's Report, to only 424, or 226 males and 198 females.

Remote Cause.—The remote causes of insanity are moral and physical. Of 5653 patients principally admitted into the different hospitals of France, Italy, and Belgium, 558 arose either from falls or blows on the head, from the abuse of mercury, or other physical causes not determined. The other 5095 cases all arose from moral causes, as religion, crossed in love, jealousy, family disputes, reverses of fortune, wounded pride, disappointed ambition, anger, fright, arbitrary detention, excess of study, libertinage, and drunkenness.

The action of moral causes in producing insanity is so striking that the passing events of the day often give the peculiar characteristic of the disease. When magic and witchcraft were believed in, Europe was overrun with persons who supposed themselves possessed by the devil. On the death of the king of France and his unfortunate family, the hospitals swarmed with dauphins destined to succeed him on the throne. The trial of the Duc d'Enghien made many insane impersonators of that illustrious person; and when the Pope was at Paris, that singular event caused many religious monomaniacs—a form of Insanity, says Esquirol, which shortly after disappeared.

Predisposing Causes.—The principal predisposing causes are age, sex, hereditary descent, and disease.

Age.—Infancy is nearly exempted from madness, and so also is childhood, except in cases of congenital idiotism. Esquirol, however, gives the case of a child between five and ten years old whose monomania lay in attempting to destroy both her father and mother. Insanity, however, as a general principle, seldom breaks out till after puberty, and when the passions are fully developed. Leuret gives the following table of the ages of 11,687 insane patients.

Under 20	1,007
From 21 to 30	2,541
,, 31 to 40	3,438
,, 41 to 50	2,293
,, 51 to 60	1,185
,, 61 to 70	819
,, 71 to 80	364
Above 80	40
	11,687

Sex.—It has been much disputed which sex is most liable to insanity; but Esquirol, from returns obtained from the different insane establishments of London and Paris, considers the numbers to be nearly equal, the number of males attacked being 6335, and of females 6892,—a result which is remarkable, considering the influence which menstruation, pregnancy, and suckling have in the production of this disease, and which Esquirol estimates as accounting for the insanity of one-sixth of the whole number of women attacked. As an approximation to the influence of social position on the patients, 44 women were unmarried, 80 married, and 20 were widows. Of the males 61 were unmarried, 123 married, and 8 widowers; which shows a larger proportion of insanity among the unmarried than among the married population in proportion to their respective numbers.

It has been thought, also, that the maniac was more particularly affected at the full of the moon; but Esquirol thinks the exacerbation attributable merely to the light, for when that is excluded the patients are as tranquil as at other times.

Hereditary.—The testimony of almost universal experience establishes the fact of a very general hereditary transmission of insanity. This is remarkably instanced among the Catholics and Quakers of England, and also among the high nobility of France, who almost in every instance intermarry, and are allied by blood to each other, inculcating a sad lesson to those parents who consult, in the marriage of their children, the interest rather than the health of their descendants. This hereditary tendency to insanity in the aristocracy is greatly insisted on by Esquirol, who states that out of 321 pauper female lunatics, only 105, or one-third nearly, were ascertained to belong to families in which insanity had previously existed; while out of 264 females of the higher classes, 150, or more than one-half, were thus connected. In general, children born before the insanity of their parents are less liable to this disease than those born after the attack; also children born of parents diseased in one line are less liable to it than parents diseased in both lines. The condition of the mother also during gestation has often a striking effect on the mental health of her future offspring; for Esquirol observed that during the French revolution many pregnant ladies whose minds were kept constantly in a state of alarm and anxiety during that epoch, brought forth children which, in their infancy, were subject to spasmodic, convulsive, or other nervous diseases; and in their youth either to madness, imbecility, or dementia, and almost without an exciting cause.

Certain diseases also are powerful predisposing or even exciting causes of insanity, as epilepsy, which gives rise to a large number of the most incurable cases

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of madness. Insanity also often alternates with phthisis —the one disease becoming latent in proportion as the other becomes active. Derangement of function, or structure of the uterus, is also a powerful predisposing cause. Many persons also become deranged after severe fevers; while Foville states that five-sixths of those he examined had more or less disease of the heart, showing the powerful effects of intemperance and of strong passions in the production of this mental affection.

Pathology.—The cranium of the insane patient is occasionally found extremely thin, and occasionally greatly thickened; but except in a few cases, espcially in idiots, its conformation and size is natural. On opening the cranium, all authors, whether English, French, German, or Italian, are agreed that in a given number of cases, however severe the malady may have been, not a trace of disease, either of the brain or its membranes, is to be met with. The proportion, says Calmiel, may be small (eight times in seventy-five), but still it is enough to prove that insanity is merely a functional disease of the brain, and also to lead to the inference that the lesions of that organ are, in many cases, the consequence of the high excitement and violent exertions of the patient rather than the causes of disease.

When any lesion exists, it is principally slight inflammation of the arachnoid and pia mater, with effusion into their cavity, generally of serum, or of serum with points of lymph, and less commonly of a gelatiniform substance. These lesions are more frequently found at the anterior and superior portions than at the base of the brain. The lesions next in frequency are thickening and opacity of the arachnoid, with effusion of serum in large quantities into the ventricles, sometimes doubling or trebling their capacity. The dura mater is also strongly adherent to the cranial bones.

The substance of the brain is generally healthy, but in acute cases sometimes strongly marked by many puncta cruenta. Again, often on removing the arachnoid, a small portion of the corticle substance, strongly injected, is detached with it. In many cases the brain is softer than natural; and in a very few cases so loaded with serum that Leuret has been enabled to express that fluid from it in considerable abundance. In a very small number of cases the brain is harder than natural. When the patient has fallen from paralysis, the lesions are similar, but occasionally traces of apoplectic effusion have been found.

Such have been the lesions commonly observed in insanity; and if it be asked whether they in any degree explain the seat of the intellectual faculties, they certainly do not, for the same appearances are often observed in patients who have in no degree suffered from insanity. Neither has anything been observed which could in any instance fix or confirm Gall's theory of the localization of the cerebral phenomena, for the same lesion often exists in forms of insanity totally different from each other.

Symptoms.—Insanity has many different forms, and is divided into monomania, mania, melancholia, and dementia.

It is hardly possible to understand the nature of insanity without first considering that every sense is liable to be diseased, as light things to feel heavy, small things to seem large, hot things to feel cold; or else that the senses are liable, from the irritation of the brain or other cause, to become *active*, the patient seeing persons or hearing discourses when no such person is present, and no such discourse is related. When he is satisfied by reasoning and the evidence of his other senses that what he hears or sees is an illusion, he is said to labour under an hallucination. When, however, he believes and acts upon them, he is insane. The following are a few instances of hallucination:—

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Every sense is liable to the disease of hallucination. Dr. Falconer mentions a case in which cold bodies felt intensely hot to the patient; he could not move but he was burnt. Esquirol mentions a lady who, being recommended a lavement, was desirous of administering it herself. No sooner, however, was the syringe put in her hands, than she threw it away with an expression of horror, stating it felt so heavy that she believed it to be filled with mercury, and that they wanted to make a barometer of her body. A gentleman, whose mind was in every other respect perfect, had constantly the sensation of his mouth being full of pieces of broken glass; while another, curious in his table and choice in his wines, believed everything tasted of porridge. A lady labouring under phthisis quitted lodging after lodging, being everywhere annoyed with the smell of burning charcoal. The sight also is often the seat of hallucination. Dr. O'Connor met with a patient recovering from measles, to whom every object appeared diminished to the smallest possible size. While Baron Larrey mentions another person who saw men as big as giants; and again, another party on recovering from typhus, felt himself to be ten feet high, his bed eight feet from the floor, and the opening of the chimney as large as the arch of a bridge. The celebrated Pascal always believed he saw a precipice on his left hand, and always had a chair placed on that side to prevent his falling into it. The ear, also, the organ that hears "The airy tongues that syllable men's names," is likewise often affected. A gentleman riding by a barracks at evening call never got the sound of the bugle out of his ears for nine months; and everybody knows that Dr. Johnson always entertained a deep impression that, while opening the door of his college chambers, he heard the voice of his mother, then many miles distant, calling him by his name, "Sam! Sam!"

It is remarkable that these hallucinations sometimes occur when the organ is itself destroyed. Esquirol, for example, attended an insane merchant who, though labouring under gutta serena, not only heard persons talking to him, but saw visions that perfectly enchanted him. He had also under his care a Jewess, who was blind, and yet saw things the most strange. She died, when the optic nerve, from its anterior point of decussation till it entered the globe of the eye, was found atrophied, so that the transmission of any exterior impression was impossible. He mentions also two other women absolutely deaf, who had no other delirium than that of hearing every night sundry invisible persons that addressed them.

Such are instances of hallucinations, and the images thus excited are as vivid as those produced by external causes, so that the patient when insane entirely believes the empty and false forms he sees, the ideal sounds he hears, to be real and substantial. Nothing can persuade him of their fallacy; but, like Macbeth, he insists, "If I stand here I saw him." It is only by the occurrence of a temporary hallucination that we can explain the apparition of the ghost of Cæsar to Brutus, promising to meet him at Philippi; or the existence of the familiar spirit which conversed with Tasso. It is probable, also, that such hallucinations formed a portion of the psychological phenomena occurring in the cases of Luther, Ignatius Loyala, and Swedenborg. Out of 100 insane persons, 80 at least labour under hallucinations of one, two, or even of all the senses. Thus they are perpetually holding conversations with imaginary beings, seeing ecstatic visions, fighting with enemies ready to destroy them; and in a few instances an angel of light is at one ear, and the angel of darkness at the other. Some, again, smell all the odours of Arabia, while to others everything they eat tastes of human blood, or of raw flesh, or is gritty with arsenic.

In insanity, also, if a part be diseased, the imagination often personifies it, and converts it into some strange reality. Thus, a young woman who suffered from pain in the crown of her head was convinced it was caused by a worm gnawing her brain. An old general, who believed the sun was the cause of all his ills, suffered occasionally pain in the knee; and in one of these paroxysms he seized the pained part with one hand, and striking it with the other cried out, "Ah! rascal, you shall not escape me now!" evidently conceiving his knee to be a thief. There are constantly in the hospitals patients who, suffering pains in the stomach, believe that organ to be filled with serpents or frogs. One man complained his stomach was filled with mice, when a friend advised him to swallow a cat. A woman, for many years a lunatic at Salpêtrière, and who suffered severely from abdominal pains, believed she had a whole regiment of soldiers in her abdomen, and when the pains were severe that they fought with each other. Another woman, called by the patients "Mère de l'Eglise," believed to have in her entrails all the personages of the New Testament, and occasionally those of the whole Bible: when her pains were exasperated, she sometimes cried out, "Je n'y puis plus tenir quand fera t'on la paix de l'Eglise;" and at others she believed the Popes held their councils in her abdomen. This patient died, when the abdominal viscera were found adherent to each other and to the peritoneum; and the same appearances were found in a woman who believed her abdomen was filled with devils.

Of Monomania.

Having thus stated the nature of hallucinations, we must now proceed to the consideration of insanity, and first of monomania, or that form of the disease in which some one passion or hallucination so entirely possesses the patient as to lead to erroneous and often dangerous conduct. The modes of this affection are endless; some being beset by jealousy; others desperately in love, and sometimes with entirely imaginary objects; others seek their own death or the destruction of other people, or have an uncontrollable desire to commit petty thefts, or to set everything on fire. These varieties are termed kleptomonia, pyromania, autophomania, and erotomania, and so on, according to the passion or imagining of the patient. We shall only be able to give a few of the endless varieties of this disease.

Hypochondriasis is a disease of the sense of touch, combined with a morbid imagining, so that the patient believes himself to be strangely metamorphosed, changed into some inanimate thing, or else loses all knowledge of his personal identity; and this form of disease is sometimes combined with other hallucinations. The odd conceptions of the patients under these circumstances are singular enough. Men have imagined themselves to be so much butter or putty, and in the one case to be unable to bear heat for fear of melting, and in the other have forborne to walk lest their legs should be crushed by the weight of their body. One man kept the house imagining he was too large to pass through a given door-way; and when he was pushed through he screamed, affirmed his flesh was torn from his bones, and actually died of fright. One man imagined he was Aldgate pump, that his arm, which was in perpetual motion, was the handle, and bitterly complained that the inhabitants would let him have no rest morning, noon, or night. Another, that he was a seven-shilling piece, and went round to his neighbours hoping, if his wife should bring him to their shops, they would neither take him in payment nor give change for him. A third supposed himself transformed into a beer-barrel rolled along the streets. A fourth, that he was a mutton-chop, and insisted that his wife should take him daily to the butcher to be trimmed. Bishop Warburton speaks of a person who thought himself a goose-pie, a circumstance referred to by Pope in his sketch of Hypochondriasis:—

> "A pipkin there, like Homer's tripod, walks;
> Here sighs a jar, and there a goose-pie talks."

Among other singular forms of hypochondriasis is a belief in an absolute change of sex. Dr. Arnold saw a man who fancied himself in the "family way;" and Esquirol speaks of a male patient who fancied himself a woman, and felt insulted if the slightest liberty was taken with his dress. Some have thought themselves converted, like Nebuchadnezzar, into wild beasts.

In every madhouse there is a last surviving woman; a last man overwhelmed with grief and horror at having out-lived the whole world. Some patients imagine they have no soul, others no body, others that they are absolutely dead. One gentleman approaching his 90th year so far lost his mind that he assembled his family around him and announced to them that he was dead; begged, in communicating the sad intelligence to his absent friends, they would say he went off easily, and expressed himself a little scandalized that the windows were not closed on the occasion, and entreated, as a last favour, for one pinch more out of his favourite snuff-box before he was finally screwed down. Sometimes the supposed deceased party is resuscitated. One man, who received a severe wound at the battle of Austerlitz, believed he had died, and that the body he had now got was not his own, but some machine *mal faite*. Another, that he was guillotined during the French revolution, and had not only lost his own head, but, somehow or other, had got a new one. A third, that his head had been put on his shoulders with the face towards his back; and, lastly, some think they have not only lost their heads, but see them rolling on the ground.

It is seldom, however, that insanity is of so simple and harmless a nature; for more commonly the affections and feelings are subverted, and the persons most dear to us by the ties of relationship become hateful to us; while the mind is more commonly swayed by some destructive passion to effect some object criminal in itself. This state of the feelings may or may not be accompanied by hallucinations. The most extreme form of this description of monomania is androphomania.

Androphomania.—Gall gives the case of a man at Vienna, who, after witnessing a public execution, was seized with an uncontrollable propensity to kill, although he had a clear consciousness of his situation, expressed the greatest aversion to commit such a crime, shook his head, wrung his hands, and cried out to his friends to keep away. Pinel mentions the case of a person who exhibited no other unsoundness of mind than this propensity to murder; so that his wife, notwithstanding his tenderness for her, was near being destroyed, he having only time to warn her to fly. In the intervals of the paroxysm he expressed every remorse, was disgusted with life, and attempted several times to put an end to his existence. A man was tried at Norwich in 1805 for wounding his wife, and afterwards cutting his own throat, an act so repugnant to his nature that he had been known to tie himself for a week together with ropes to avoid it. Esquirol mentions a woman seized with sudden paroxysms of phrensy to destroy her children, and only saved them by locking the bed-room door and throwing the key away. Metzyer has a similar case of a nurse who requested to be discharged, and on explanation she gave as a reason that every time she undressed the child, struck by the whiteness of its skin, she had an irresistible desire to rip open its belly. The deadly purpose with which the monomaniac is seized is accomplished in many different manners and times. Sometimes the murder is long premeditated, and the victim marked out, the patient concealing a knife about his person till an opportunity for effecting his object presents itself, though that period be remote. In other cases the destructive propensity seems the result of a sudden paroxysm. Esquirol gives the case of a man relapsed into insanity, who on returning from the cellar seized a boy on the stairs by the hair, and after a few seconds let him go, saying, "Il ne vaut pas le peine." The next day he sent his wife and sister to the cellar, when he followed and murdered them, saying subsequently in explanation of the act that the cellar seemed to him all on fire. The same authority also mentions the case of a maniac who was sitting round the fire with the other patients, when he suddenly seized a chamber-pot and broke it over his neighbour's head; fortunately he was immediately secured. In a lucid interval he stated he had made this homicidal attempt in consequence of his brothers having appeared to him at that moment crying out "Kill him! kill him!" Other patients, again, are so aware of the approach of the attack, that they entreat to be confined in order that they may not commit the mischief to which they seem irresistibly impelled.

Autophomania.—Many monomaniacs, besides being impelled to destroy others, have an irrisistible propensity to destroy themselves. A gentleman who was cheerful, amiable, well-informed, and reasoned well on every other subject, made many attempts to commit suicide, giving as his reason "Je m'ennui." This patient, however, had hallucinations both of sight and hearing, imagined he was pursued by the police, and believed even to hear them through the walls of his apartment. Many of these unfortunate persons, not having resolution to put themselves to death, have killed others in order to suffer a judicial death. One woman, who reasoned, "in order that I may die I must kill some one," attempted to kill both her mother and her children. Some of these tragedies are perfectly terrific. A man in a paroxysm of insanity killed his wife and three children, and would have killed the fourth had it not escaped. After these horrible sacrifices he ripped open his own belly, but the wound not being mortal he again drew out the instrument and pierced himself through and through. This man had enjoyed a good education, and was of a mild character.

It is singular that the propensity to commit suicide is in some persons so great that many destroy themselves although in possession of fortune, of station, of objects of affection, and apparently in every other respect in the fullest enjoyment of their reason.

The ingenuity of the maniac in providing means for his own destruction is often singular. Some have thrown themselves under the wheels of a waggon; others have drowned themselves in an incredibly small quantity of water; others have most ingeniously strangled themselves; and others, more closely watched, have swallowed all sorts of heterogeneous articles—pins, needles, bits of broken glass, nails, buckles, and any and every hard substance they could force down their throats. Pinel gives the case of a man who had cut off one of his hands with a hatchet before his arrival at Bicêtre, and afterwards in spite of his bonds attempted to tear the flesh off his thigh with his teeth.

Pyromania.—The derangements of feeling and of reason may take other forms than murder; and arson is one of the more common. Some seem impelled to this criminal act by the mere sensual gratification of the excitement, confusion, noise and bustle consequent on the conflagration. One lad committed repeated acts of arson solely from the delight he took in the blaze, the ringing of the bells, and in the thronging of the people. At Cambridge, there was a student who was said to have attempted to set fire three times to his chambers, and probably from this cause. Often, however, it results from a process of reasoning, or from some hallucination of the senses. The destruction of York Cathedral by Martin was effected under a feeling of divine impulsion, and of his being commissioned to purify the House of the Lord. One maniac set fire to his bed, thinking to escape in the confusion it would cause, and another from believing that, like Shadrach, Meshach, and Abed-nego, the flames would respect his person.

Kleptomania.—Some have an irresistible desire to steal. Gall mentions that the first King of Sweden was always stealing trifles. The wife of a celebrated physician at Leyden never went into a shop without stealing; and a countess at Frankfort had the same propensity. It is related of a physician that his wife was always obliged to examine his pockets in the evening, to restore the things she found there, for he always took something else as well as his fee.

Esquirol gives the case of a lady of an exactly opposite character. Her insanity consisted in a ceaseless dread of appropriating what did not belong to her; she therefore combed her hair an endless number of times in the day, examined her dress minutely every time she put it on or took it off, felt in her shoes, turned up the chairs, looked under her plate, and thus consumed many hours in the day in endless cares, lest something of value might have adhered to her dress. Such are some of the forms of this wonderful malady, whose varieties are endless. The most common are theomania, chrysomania, doxomania, demonomania, erotomania. Thus, some govern the sun, the moon, and the weather; others are savans, distinguished by their discoveries or inventions; others poets or orators, whose discoveries we must listen to under pain of their displeasure; others are kings or emperors, commanding the universe, and giving protection and dignities to those who surround them; others are submitted to the gentler sway of love, and believe themselves to sojourn among the sylphides and houris; others are gods or prophets in communication with heaven, and the immediate agents of some Divine commission; while others are the separate or conjoined persons of the Holy Trinity.

Mania, Melancholia, and Dementia are forms in which the powers of the mind are more generally overthrown, and the senses more commonly affected by hallucinations. In many instances the association of ideas is either so destroyed that the patient is in a state of complete delirium, or else the judgment is erroneous, the memory impaired, and the affections perverted.

It is seldom in mania that the patient, as in monomania, is only insane on one subject. His mind, says Esquirol, is a perfect chaos; all is violence, effort, perturbation, and disorder. He confounds time and space, associates persons and things the most unnatural, creates images the most unreal, and lives isolated in feelings and reasoning from all the rest of the world; his actions also are often wicked; he hates all that he loved, and wishes to overthrow and to destroy everything. The female lunatic, also, perhaps in health the model of candour and virtue, gentle and modest, an affectionate daughter, a devoted wife, and a good mother, becomes in this disease bold and furious, exposes her person unmoved to the gaze of every eye, is blasphemous and obscene, respects no law either of decency or humanity, and threatens her father, strikes her husband, or perhaps murders her children.

The following case is detailed by Esquirol as one of the most general examples of melancholia. A young woman, aged twenty-three years, lived in the country, but had been frightened by some soldiers. For four years afterwards this young person had scarcely been heard to utter a word, and the few she did utter seemed expressive of the terror she was still possessed with. At first she obstinately refused to quit her bed or to eat, but when obliged to get up she went and seated herself on the same bench, and always maintained the same attitude, her head being inclined to the left side, her arms crossed and resting on her knees, and her eyes fixed on the ground, and in this position she remained the whole day. She never asked for food, and it was always necessary to bring it to her and to press her to eat, but still in eating she preserved the same posture, except that she used her right hand. At no time did she ever answer any question. It was necessary to tell her to go to bed; when she undressed, rolled herself up like a ball, and then buried herself under the clothes.

Of *Dementia*, the following may be taken as a specimen. A merchant, after some losses in trade, became perverted in his affections, neglected his business, and refused to eat, for fear of being poisoned, and, indeed, committed all sorts of excesses. This state of excitement was followed by a state of depression, during which he stood by his bedside, his head bent forward, his arms hanging by his side, his eye vacant and fixed, and his countenance unchangeable. This was followed by another paroxysm of excitement, in which he spoke incessantly; abused his family; walked with a rapid step; overthrew all in his way—laughed—stopped—heard and saw his enemies day and night, and especially his mother, who reproached him. The stage of depression again came on; he slavered from the mouth and nose; his urine was passed involuntarily; he refused to eat or drink, or to undress himself, and when placed in bed, lay all night in the position he was first placed in; kept an absolute silence, and at length fell into a state of stupor, from which nothing could rouse him.

Almost all persons suffering from dementia have a *tic*. Some walk incessantly, seeking something not to be found, while others can scarcely drag their legs after them; others walk round and round eternally in the space of a few feet; while others lie rolled up in bed, or extended on the ground. Some write incessantly, but the words or sentences have rarely any connexion or meaning; others talk incessantly, but incoherently, beginning a sentence without being able to finish it; or so completely is the association of names with things lost, that they utter nothing but what Hamlet would call "words! words!" one will strike his hands day and night, while his neighbour will balance his body in one position with a most tiring monotony of movement; another will weep and laugh, whistle, dance, and sing during the whole day; others, again, dress themselves in all sorts of whimsical manners; while others will display a few rusty nails or common pebbles as the riches of the universe. The gradations of this form of madness are, first, a chaotic state of the faculties; secondly, the loss of all sense of propriety; and, lastly, the entire oblivion, or nearly so, of every spark of intelligence.

In dementia the patients are extremely liable to become paralytic; and an affection of the tongue, denoted by a thickness of speech, is the first symptom. After a time, the speech is more manifestly affected, and is followed by a loss of power in the limbs of one side, more marked in the lower extremity, so that their step is feeble and straggling. In the last stage they are completely paralytic, and only able to utter a few unintelligible sounds. Of 120 paralytic cases of dementia 13 were in the first stage, 52 in the second, and 55 in the third stage of this calamity.

Looking to insanity generally, it is seldom that the ideal character assumed by the patient is well sustained; more commonly it is little more than the name. In a few cases, however, it is well supported, and the prophet assumes a tone, energy, and attitude suited to the envoy of the Almighty, and the emperor the majestic step and deportment corresponding to his fantastic regal state. In these instances he almost always sees visions, or is visited by invisible interlocutors, to whose dictates he generally becomes fatally obedient.

Whatever form insanity may assume, like other diseases it may be divided into three stages. The first stage may be sudden in its attack, sometimes almost instantaneous, but more commonly it is marked by a short prelude of an indefinable aberration from health both of body and mind; for the patient, besides being out of health, is easily excited, is headstrong, and ready to commit every sort of extravagance. In the second stage the disease is formed; while in the third stage the patient, if he recovers, becomes more docile, more natural in his affections, sleeps better, and takes more food; or else the disease may become inveterate, incurable; or epilepsy, palsy, or other phenomena may unexpectedly terminate his existence.

The attack of insanity may last many weeks, many months, or many years, but in most cases it has a tendency to remit; and hence authors have divided this disease into continued, remittent, and intermittent.

The remittent form differs from the continued by the fact of remissions more or less marked. Thus many patients are violent by day, yet are calm and tranquil at night; while others, on the contrary, are tranquil by day, but are sleepless and violent at night. Sometimes the remission is only every second day, when it takes place with great regularity. This tendency to remit has been remarked by Shakespear:—

> "This is mere madness;
> And thus awhile the fit will work on him;
> Anon, as patient as the female dove
> When that her golden couplets are disclos'd,
> His silence will sit drooping."

Again, the paroxysm of insanity is sometimes so regular as to assume an *intermittent* type, occurring every week, every month, every three months, twice a-year, or every one, two, three, or four years, often without any other known cause than the return of the period.

Diagnosis.—One of the great difficulties of diagnosis in this disease is to distinguish monomania from sanity; for, with the exception of some given morbid delusions, the patient may be rational on all other subjects, and in some instances even the powers of his mind are increased. One celebrated instance of this kind occurred to the late Lord Erskine. The lunatic had indicted a most affectionate brother, together with the keeper of the madhouse, for false imprisonment. He was placed in the witness box, and Lord Erskine, not instructed in what his lunacy consisted, consumed the whole day in fruitless attempts to expose his infirmity. At length Dr. Sims came into court, and suggested to the learned counsel that the patient believed himself to be the Lord and Saviour of mankind. Lord Erskine then addressed him in that character, and lamented the indecency of his ignorant examination, when the patient expressed his forgiveness, and with the utmost gravity and emphasis, in the face of the whole court, said—"I am the Christ!" In a similar case, tried before Lord Mansfield, the patient evaded the questions of the court the whole day, till Dr. Batty arriving, asked him what had become of the princess with whom he corresponded in cherry-juice. Instantly the man forgot himself, and said it was true he had been confined in a castle, where, for want of pen and ink, he had written his letters in cherry-juice, and thrown them into the stream below, and that the princess had received them in a boat. These answers of course immediately terminated the cases. It is plain, therefore, that we shall often be foiled in examining an insane patient unless we make some previous inquiry as to the points on which the party is deranged.

Prognosis.—As a general rule, the younger the patient the greater the chances of recovery; but above the age of fifty few are cured. Of those that recover, the exciting cause often greatly influences the result; thus most recover when it proceeds from drunkenness, provided the patient can be restrained from drinking; and also if it arises from slight moral or physical causes. When, however, the shock is severe, the recovery is less certain, and if combined with epilepsy or any organic affection of the brain, recovery is almost impossible. The form of the disease also greatly influences the result, for when the patient suffers from hallucination, the chances of recovery are much diminished. Taking insanity generally, the maniac has been cured in the ratio of 1 in 2·05; the monomaniac as 1 in 1·78; the melancholic patient as 1 in 2·33; and the stupid as 1 in 3·33. If, when labouring under dementia, the patient be seized with palsy, Esquirol knows of no instance of his surviving a twelvemonth after the first symptom, or the affection of the speech.

The mortality among the insane appears to be infinitely greater than that of the population generally, and on a calculation of nine years at Bicêtre, an hospital containing 1200 patients, the annual deaths were as 1 in 6·7 cases. The largest mortality is from dementia, the least from monomania; in the latter, indeed, where there is no tendency to suicide, the duration of life is little abridged, so that premature death is almost in all cases owing to accidental causes.

Treatment.—The treatment of insanity resolves itself into the medical, the moral, and the dietetic treatment.

All the best and most candid practitioners admit that medicine has very little direct action on the brain, so as favourably to influence the course of the disease; but indirectly, however, by regulating the different actions and secretions of the other organs, and thus improving the general health, the happiest results are often obtained. Thus, when the bowels are constipated, the mode of treatment is determined by the state of the tongue; or, supposing it to be white and coated, the sulphate of magnesia, or other neutral salt, combined with tinct. hyoscyami in the proportion of ʒj. of the former to ♏xv. to ♏xxx. of the latter out of camphor mixture is among the best remedies; but any other purgative or opiate, in corresponding proportions, may perhaps be equally serviceable. If, on the contrary, the tongue be clean, the cathartic should be given with some slight bitter, as the infusi aurantii or the infusi gentianæ comp. In some cases the bowels are not only exceedingly obstinate, but the patient is greatly averse to all medicines, and now one or two drops of croton oil placed on the tongue produces free evacuations, and prevents the necessity of employing violence.

The mild purgative treatment formed the basis of cure in the school of Pinel and of Esquirol, and they usually combined it, in cases of violence, with the application of cold to the head and of warmth to the lower parts of the body, such as placing the patient in the warm bath and giving him the cold douche. The further treatment consists in restoring any other functions that may be in defect or in excess, as the functions of the uterus in the female, and of the liver or heart in both sexes, and by the usual remedies applicable for those purposes.

Most practitioners are agreed, as a general principle, that bleeding ought to be avoided. The continental physicians are entirely averse to it, as increasing rather than calming the excitement, and tending to produce organic changes of the brain, rather than to cure or prevent them. In this country it was formerly the custom to bleed the patients in spring and fall; and Crowther states he has bled 150 at a time, and that the blood in every case was free from any inflamed appearance. There was also the absence of all inflammatory character in the blood of 194 patients out of 200 bled by Dr. Haslam. In the present day some difference of opinion prevails as to small but none as to large bleedings. "When loss of blood," says the late Sir William Ellis, "is excessive, the vital power in numerous instances is never recovered, and the patient sinks into a state of fatuity, or dies. Unfortunately, many patients received into public hospitals as recent cases, have previously undergone this exhausting process, the constitution has not energy to rally, and there is a much greater mortality among the recent than among the old cases, in proportion to their number and ages. There is a much greater probability of an ultimate cure when nature is left to herself, and the violence of the attack allowed to be expended, than when her powers have been wasted by excessive depletion." The same authority also adds, "As far as my experience extends, I have not seen any advantage arise from the use of blisters upon the head during the paroxysm. They appear rather to create irritation than to allay it, and they prevent by their application the use of cold water or of ice, which has often the most salutary and instantaneous effects." And, again, with respect to opiates, "That medicine which will allay watchfulness in one will not in another, but, on the contrary, increase it. This is particularly the case with opium, which is rarely found admissible in insanity. It more frequently creates heat and general febrile action than sleep." In cases, however, of recent excitement, morphia in considerable doses has been found most beneficial.

The moral treatment is by many supposed to constitute the more principal means in the cure of insanity, and it must be admitted to be a most important adjunct. The first important rule is to remove the patient at once from his family; in slight cases, in order that he may be induced to exercise such command over himself as he possesses; and in severe cases, in order to prevent his doing mischief either to himself or others. In the latter instance, if the patient be excited, it is proper to place him at once in a dark room, and remote from noise, in order that there may be as few objects as possible to rouse and fix his attention.

When it is necessary to confine the patient, an overwhelming force should be procured; for a maniac often believes himself to have supernatural powers, and will often fight against one or two persons, when he will feel it useless to resist three or four. The usual mode of confinement is the strait-waistcoat, or a pair of canvas sleeves joined by a broad shoulder-strap, the part covering the hands being made of stiff leather, to prevent the patient grasping anything, or a pair of leather hand-cuffs. It is sometimes necessary to secure the feet, when a couple of leathern straps, well lined with wool, placed round the ankles, and secured to staples in the bedstead, is all that is necessary. Occasionally, the body must be secured; when a thick quilt should be thrown over the clothes, and fastened by three leathern straps on each side. When the patient is able to sit up, an easy mode of confinement is an arm-chair, each arm being hollowed out and made to open so as to contain an arm of the patient. In this manner each upper extremity, as well as the trunk, can be fastened, while the legs may be secured to a foot-board, which, if perforated with holes, will enable us to apply hot water constantly to the feet.

When intervals of reason are established, the patient should be encouraged to exert all the self-command he possesses, by great kindness and attention, and by sometimes punishing his faults and his follies by slight privations; and when the patient is visibly not doing his best, or is malicious, the cold douche has often excellent effects, and any improvement should be rewarded by increased indulgences. As the convalescence advances, he should be induced to undertake some manual labour, or some office in the household, which, by amusing his mind, and invigorating his health, greatly tends to his restoration. When the circumstances of the patient admit of it, travelling, which embraces change of air and change of scene as well as exercise, is often highly salutary in incipient cases. Much has of late been spoken of the introduction of music and other amusements into asylums. Esquirol, however, who made many experiments of this kind, induced the musical professors of Paris to perform concerts at Salpêtrière, and also took his patients to the theatres, but considered these amusements in every instance to have acted unfavourably. When reason is restored, and the affections again fix themselves on their natural objects, the patient may now be allowed to see his friends, and have his attention directed to the affairs and interests of his family; but it should be remembered that the mind remains weak and enfeebled for some time after apparent recovery, and consequently the patient's restoration to society should be gradual.

Dietetic Treatment.—In general the patient requires a light but nourishing diet, with a limited portion of wine. When, however, the head aches, or the tongue is coated and white, neither meat nor poultry should be allowed.

EPILEPSY

Is a sudden and complete loss of all consciousness, with convulsions.

This disease has been known from the earliest antiquity, and is remarkable as being that malady which, even beyond insanity, was made the foundation of the doctrine of possession by evil spirits both in the Jewish, Grecian, and Roman philosophy. The number of adults that fell from this disease in England and Wales, in 1839, was 1186, of children, 25,408,—making a total of 26,594.

Remote Cause.—When epilepsy is the result of a powerful original tendency, it often occurs without any apparent cause, and when the patient is in his best health. The effects of moral causes in its production are so well known that Raphael has introduced into his picture of the Transfiguration, a boy falling into an epileptic fit. Besides moral causes, errors in diet, excess of any kind, blows on the head, every structural or functional disease of the brain, and especially insanity; or any severe disease, as fever or small-pox, are all powerful remote causes. In children, the irritation of teething is the most common cause.

Predisposing Causes.—The large number of children that die of this disease has been mentioned; and indeed in France epilepsy is termed "mal des enfans." The next most frequent period of life is puberty; and its frequency, perhaps, as a primary disease, decreases from that time till 50, when it again increases, from the tendency the brain now has to insanity and to structural disease. As epilepsy is common in idiots whose heads are deformed, it has been affirmed we are liable to this disease in proportion as the facial angle approaches to 70°. There are many exceptions, however, to this law, as witness the fine head of Napoleon.

It is supposed that in infancy, and under seven years, it occurs in nearly equal proportions in both sexes. After puberty, when the distinction of sex is marked, some authors contend it is more common in males than females: Dr. Elliotson thinks in the proportion of 27 to 11: Esquirol, however, says, on comparing the number of epileptics at Bicêtre and at Salpêtrière, the number of women attacked was one third greater than of the men.

It is also a very general opinion that this disease is hereditary.

Pathology.—It has been affirmed that in 15 out of 20 cases, in which the brains of epileptic patients have been examined, the structure of that organ has been in every respect healthy. Even when the patient has died during the paroxysm, the brain has in many instances only been found congested. Epilepsy is therefore merely a functional disease, and being a purely functional disease its particular seat is not determined. But although epilepsy may exist without any disease of the brain, or of its membranes, it must be admitted that the brain and its membranes are occasionally found in every state of disease to which those parts are liable. Thus, the membranes may be inflamed, thickened, or ossified, with every form of effusion to which they are liable; or the substance of the brain may be indurated or softened—the seat of abscess, of cancer, of tubercle, or of other structural disease—and of which the epileptic attack is merely a symptom.

Symptoms.—Epilepsy has no varieties, but it may be grave or slight. The attack of this disease often occurs without any previous warning; so much so that Georget estimates, that in 95 cases out of 100 there are no premonitory symptoms. Many patients, however, on the approach of the fit have vertigo or headache; some swelling of the veins, or beating of the arteries of the head; while others have ocular spectra or affections of the other senses.

Dr. Gregory used to mention, in his lectures, the case of an officer whose paroxysm was always preceded by the spectre of an old woman dressed in a blue cloak, who issued, as he imagined, from the corner of the room, and knocked him down with her stick. Dr. Fothergill attended a Quaker who always fancied he saw his garb covered with spangles before he fell into the fit. These ocular spectra are very numerous; but the most common are flashes of light, tadpoles, flies, coloured areolæ around the flame of the candle, black dogs and white horses. Others have hallucinations of the ear, as the ringing of bells, or the roaring of the sea, while others again are annoyed by the smell of disagreeable odours, or by the sensation of unpleasant tastes.

When the sense of touch is the seat of the hallucination, the term "aura epileptica" is used to express it. In these cases the patient has often the sensation of a fluid creeping from the fingers or toes upwards towards the trunk; others feel as though a spider or other insect were crawling over the skin. Dr. Elliotson speaks of a patient that had two auræ, each of which ran along the dorsum of each foot, ascended up the front of the legs and thighs to the trunk, where they broke into five streams, all of which again met at the epigastrium, and, having reached this point, he fell into the fit. These sensations appear to reside in the skin, and not to follow the course of any particular nerve.

Esquirol met with a case, a woman, in which the prodrome was the patient's turning round for a considerable time; and another, in which the party ran with all his might, till at length he fell down, overpowered by the disease.

In the *adult*, whether these warning symptoms be or be not present, the attack usually commences by the patient uttering a cry, losing on the instant all consciousness, and falling down in convulsions, his mouth being covered with foam. The convulsions vary from the most trifling and transitory convulsive movement, to the most frightful, terriffic, and long-continued struggles. In mild cases only one limb is convulsed; in others only the face, the lip, or the eye. Esquirol gives the case of a lady whose fits were so slight that although often seized on horseback she never fell off. In a few seconds she was recovered, and resumed the conversation by finishing the sentence she was expressing. In this case, however, the epileptic cry and the convulsed eye denoted the true nature of the attack. One lady, advanced in life, suffered from fits so slight, that she preserved her seat in her chair; so that, except some slight convulsive motions about the mouth, followed by a short sleep, the attack would have passed unnoticed. Attacks so mild often occur many times in the day, last about five minutes, and leave no feeling of ill health behind.

In severe forms of the disease the convulsions are more formidable; the hair stands on end, the forehead is wrinkled, and the brow knit. If the lid be opened, the eye is seen injected, sometimes convulsively agitated, at others in a state of strabismus, and sometimes fixed: more commonly the lid is quivering, half open, showing the white of the lower portion of the conjunctiva. The face is red, or livid and swollen; the teeth generally clenched, and the mouth covered with foam; sometimes, however, the mouth is open, and the tongue thrust forward; and should the masseter muscles now act spasmodically, it may be bitten through, or otherwise much injured, and the foam consequently be mixed with blood. The force with which the jaw closes is so great, that the teeth have been broken and the jaw luxated. The limbs also are violently convulsed, thrown about in every direction, and with such power that it often requires three or four persons to prevent the patient seriously hurting himself. In these convulsions, also, his hands are strongly clenched, and his body often arched backwards, as in opisthotonos; and in this case, on the muscles relaxing, he falls to the ground with great force. While the limbs and trunk are thus powerfully agitated, the muscles of the chest are spasmodically fixed, and hardly admit the act of respiration.

The functions of organic life are not strangers to this scene of tumult and terror. The pulse is generally frequent, sometimes hard and intermittent, and at others scarcely perceptible, although the heart beats strong and tumultuously. The respiration is stertorous; the stomach and bowels troubled with borborygmi; the skin inundated with sweat, while the urine, semen, or fæces, are occasionally emitted. Blood also sometimes flows from the eyes, ears, or nose, frightfully expressive of the violence of the attack.

When the paroxysm has reached its crisis, the muscles relax, the convulsions subside, the respiration becomes more free, the pulse more regular, and the countenance more natural; and at length the patient falls into a heavy sleep, from which he awakes sometimes in good health, but more often shaken, exhausted, and suffering from severe heachache, which lasts some hours or some days. In neither case, however, has he the slightest consciousness or remembrance of what has passed. In other instances the termination of one paroxysm is but the beginning of another, and the succession is occasionally so continued that the attack, with short intermissions, may last twenty-four, forty-eight, or even more hours.

When *Children*, from teething or other cause, are seized with epilepsy, the attack is often preceded by a spasmodic affection of the larynx, causing the hooping or crowing sound so well known to every practitioner; but it may and often does take place without any warning. In the former case, the child perhaps is in his best health, but on awaking is seized with the characteristic hoop, often accompanied by a spasmodic flexion of the thumb against the palm ; or else the fingers are clenched, or the toes bent. These symptoms may occur a varied number of times, till at length, with or without this warning, the eye is seen staring, fixed, or convulsed; the face and extremities pale or livid; the hand clenched, the body rigid, and the head and trunk curved backwards. The fit is now formed; and if we examine the fontanelle, we find it distended and pulsating. These symptoms generally last only a few minutes, when a strong expiration takes place: a fit of crying succeeds, and the child, much exhausted, recovers its consciousness, and, after a short interval, generally falls asleep. These convulsions seldom occur during the early periods of lactation, nor until the period of the child cutting his teeth, nor after three years of age.

The duration of the paroxysm is very various. In children they seldom, as has been stated, last more than a few minutes. In the adult they often do not exceed that period; but in many cases they last half an hour to two hours, while in others the greater part of the day passes before the paroxysm terminates.

It seldom happens that the paroxysm occurs but once. In the mildest case in the child, it is commonly repeated three or four times in the course of the first three or four years of childhood, while in other cases it will occur three or four times in the day; and in severe cases the child is hardly out of one fit before it falls into another, till at length they gradually subside. In the adult, the frequency of the fit varies extremely in different patients. In some instances there is an interval of several years; at others it returns annually, or every six months, or mensually, weekly, or even daily, while others will have twenty or thirty fits in the course of the same day. The paroxysm, however, returns not only periodically, but also at every irregular interval. The period of the day the attack takes place is also very varied, for it may occur during the day, at night, when asleep, or in the morning, when just awaking.

Such are the laws relating to the paroxysm; but epilepsy is not only frightful from the violence of the symptoms, but also from the serious effects it may produce on the moral character as well as on the physical frame of the unhappy patient. Thus, some fall into the fire and are burnt to death ; others into the water, and are drowned ; others give themselves a black eye, or other bruise; while, in some cases, a limb has been fractured. Many epileptics have a convulsive action or *tic* of the muscles of the face, or their legs waste and are unable to support the weight of the body. In some instances the leg has been flexed under the thigh, a contraction which has lasted more than a year, while, in others, the patient has become paralytic. A case of this latter description occurred lately in St. Thomas's Hospital, in a woman about 40, who had not only lost entirely the use of one side, but although she retained her voice, and understood what was said to her, she was incapable of uttering an articulate sound.

Aretæus, in describing with his beautiful perspicuity the symptoms of epilepsy, has not neglected to speak of the baneful influence of this disease on the intellect, of the memory being lost, of the imagination being impaired, and of the functions of the brain being, in many patients, so subverted that they fell into incurable insanity. Esquirol gives the cases of 385 epileptics under his care, in the hospital Salpêtrière, and he states that four-fifths were more or less insane. The remaining fifth had preserved their reason, but, he adds, " a reason so broken !"

Diagnosis. — Epilepsy is to be distinguished from apoplexy and hysteria. It differs from apoplexy by the violent convulsions which accompany it, and by the foaming at the mouth; and from hysteria by the absence of the rising of the throat, of the screaming, laughing, and crying peculiar to that disorder. It must be admitted, however, that the diagnosis between these diseases is often difficult.

Prognosis.—Epileptic convulsions during teething generally subside about the second or third year ; children, likewise, first seized between three and four years old, are often cured, or it often subsides at puberty, except when hereditary. Hippocrates imagined that epileptics attacked after puberty are incurable, and this is certainly the fact when epilepsy is conjoined with insanity. Pregnant women attacked with epilepsy are in great danger.

Treatment.—The treatment divides itself into what is to be done during the paroxysm, and subsequently during the interval.

The best practitioners are of opinion, when adults are labouring under the paroxysm, that, in general, little can or ought to be done except bringing the patient into fresh air, taking off what may be around the neck, and baring the chest, together with the more imperative duty of preventing the patient doing himself any injury. Bleeding, so often had recourse to, except in parturient women, is rarely found beneficial, and is supposed, in many instances, to prolong the attack. If, however, the paroxysm be greatly prolonged, cold to the head, and opening the temporal artery, may be of some service.

The paroxysm passed, the probable cause should be investigated, and if possible removed; the state of the bowels should be particularly inquired into and regulated, and leeches should be applied to the temples, if the headache be severe. In women, also, the menstruations, if defective or excessive, should be remedied. These few simple rules are of the first importance, not only as removing the immediate inconveniences incident to the attack, but also as a means of prolonging the interval, and, perhaps, preventing its future occurrence. In a few instances, the patient by their adoption is cured; but too commonly the fit returns, and then it must, in candour, be admitted that the pharmacopœia at present furnishes no efficient curative remedy. The most usual analeptics are valerian, iron, zinc, quina, misletoe, musk, opium, assafœtida, mercury, the iodide of potash, camphor, æther, and the preparations of turpentine. The argentum nitratum, once esteemed a specific in this complaint, has not only failed, but, by occasionally staining the rete mucosum of a dingy blue, has often permanently disfigured the patient. Of the long catalogue which has been mentioned, each medicine is, perhaps, useful for a few weeks; but after that period its good effects are, for the most part, lost; so that it would appear to act rather mentally than physically, or through the influence of the imagination than potentially, in removing the cause and altering the action of the brain.

In cases in which epilepsy is conjoined with insanity, every attempt at the cure of the patient has been painfully unsuccessful. Esquirol states that, at Salpêtrière, he tried, on 339 epileptics, "bleeding" in all its forms, purgatives of all kinds, baths of all temperatures, as well as every kind of vegetable or mineral antispasmodic. But, as the result of his great experience and vast variety of practice, he found that every new remedy suspended the access for about a fortnight, and, in some cases, for one, two, or three months. After these periods, however, it always returned, so that he never saw one case in his hospital practice cured, nor was he more successful in his private practice; for although the paroxysm was often suspended by the confidence inspired by consulting a new physican, yet the remission or suspension was short, and the disease always re-appeared. He concludes that hysteria may have been mistaken for epilepsy, and been cured, but not epilepsy itself.

With respect to local or derivative treatment, as issues, setons, and actual cautery, he states that, when Pariset went to Cadiz to investigate the nature and causes of the yellow fever, raging in 1821 in that town, he was left in charge of Salpêtrière, when he found 20 epileptics treated with two, three, or more moxas on the vertex of the head, which had burnt down to the external table of the skull. These wounds he kept open with great care, but not one patient was cured. In a young epileptic, whose fits were preceded by an "aura" commencing in the great toe, he cauterized that part down to the bone. The aura epileptica disappeared, but the paroxysms became more frequent and more violent.

Although the medical treatment of the adult is so unsatisfactory, yet the treatment of epilepsy occurring in children during teething is almost always successful. The practice, on the child falling into a fit, is immediately to place it in a warm bath, and to pour cold water on its head, to lance its gums, and to throw up an enema. These means generally bring the child to himself; and the after-treatment is to apply a few leeches to the head, to purge it with calomel, either alone or combined with some other cathartic, and to diminish the quantity and quality of its diet. These means are all the case admits of, and they are very generally successful. Bleeding, it should be remembered, should be used with great moderation, for these fits seldom affect the intellect, and have a tendency to subside spontaneously in a very few months. When depletion, however, is carried to excess, the child's health is greatly broken, and the probability is, that the brain is rendered more irritable and the fits more frequent. Slight opiates, by soothing the irritation of the mouth, are useful in every stage of the complaint, and when greatly debilitated some mild tonic treatment may be necessary to restore the little patient.

Dietetic Treatment.—In the adult the diet should be light, and the patient live remarkably temperate. The diet of the child should be, if possible, its mother's milk, with or without arrow-root. If above three or four years of age its diet should consist entirely of farinaceous or other vegetable matters.

HYSTERIA

Is a nervous disorder, commonly of a paroxysmal character, in which the patient experiences the sensation of a ball rising in the throat, or a feeling of suffocation, which may or may not be followed by convulsions, during which she laughs, cries, screams, and although apparently insensible, yet generally retains much consciousness of what is passing around her.

This disease is mentioned by Hippocrates in his "Natura Muliebrum," by Plato in his "Timæus," and also by Galen. It is likewise treated of in the works of the earliest modern writers on medicine. No death from this disorder is to be found in the reports of the Registrar-general.

Remote Cause.—The remote causes of this affection are rather moral than physical; and in a young person predisposed to the disease almost any mental emotion will excite it, as anger, disappointment, jealousy, protracted expectation, the loss of a husband, a friend, or a child; indeed, all that brings the passions into play is a cause of this disease, and many women cannot go to church, or witness a tragic representation, without suffering from their "sex's fits."

Predisposing Causes.—This disease almost exclusively attacks females between the ages of 15 and 45, or during the most sexual period of woman's life. The parties most liable are the unmarried, and of these those that labour under amenorrhœa or menorrhagia. The married woman often suffers just after conception, or before parturition, or subsequently from protracted suckling. The barren woman, however, is most liable, and probably from her mind being acted upon by a greater number of exciting causes. Taking classes of women, the higher classes, from their higher living, artificial breeding, and false estimate of life, are greater sufferers than the lower classes.

But although this is a disease almost peculiar to woman, it is not entirely so, but occasionally affects the "nobler sex." Shakespear has made Lear exclaim, when Glo'ster relates the cause of his being put in the stocks—

> "Oh, how this mother swells up toward my heart!
> *Hysterica passio!*—down, thou climbing sorrow
> Thy element 's below!"

It sometimes also occurs in minds less torn by passions, and of less vigour than Lear's, and is not unusual in men of weak constitution and feminine habits. One remarkable case of this kind occurred some years ago in St. Bartholomew's Hospital, in which the patient, a tailor, when seized with the paroxysm, not only shouted, screamed, hallooed, but actually, by the force of his gluteal muscles, would jump his heavy bedstead into the middle of the ward.

Pathology.— It is seldom the patient dies from hysteria, but occasionally women have, in their moments of ungovernable feeling, fallen by their own hands; some by cutting their arms across so deep as to divide the brachial arteries, and others by other means, as hanging or poisoning Nothing, however, has been discovered, on the most minute examination of the body, to account for this affection. It is, therefore, merely a disease of function, or one of the neuroses.

In speculating on the seat of this affection, the ancients supposed it to be the uterus roaming about the body in search of impregnation. Looking, however, to the excited state of the passions, the general convulsions of the whole body, and the affection of the eighth pair, there seems no doubt its seat must be in that mass whose influence is so universally felt all over the body or the brain.

Symptoms.—The forms and degrees of hysteria are so numerous that the difficulty of describing this disorder is very great. The modifications of age, temperament, states of nervous sensibility, physical and moral education, and grades of society so influence it that it is only possible to give a most general outline. It is usually divided into three forms: or, first, the globus hystericus without convulsions; secondly, into its paroxysmal form, or the globus hystericus with convulsions; and again, into those irregular and anomalous forms which often manifest themselves during the intervals.

The milder forms are those which terminate without the formation of the paroxysm. They commonly begin with pains in the epigastrium, in the left side, or in some other part of the abdomen; or else the patient is generally nervous, her feelings excited or depressed, and these symptoms having existed for a greater or less length of time, a ball, the "globus hystericus," rises apparently from the lower portion of the abdomen, and proceeds upwards with various convolutions to the stomach, and thence to the throat, causing a sense of suffocation. At this point the slighter forms often stop, but are frequently followed by headache, stiffness of the neck, general weariness, a profuse discharge of a light-coloured limpid urine, and by great flatulence, the patient often becoming almost instantaneously distended with wind.

When hysteria assumes a paroxysmal form or "fit," it may be preceded by the pains and mental feelings which have been described; but not unfrequently the attack is sudden, and often caused by some momentary and transitory occurrence. In these cases the patient bursts out into a fit of immoderate laughter or crying, the globus hystericus then rises, and no sooner reaches the throat than she falls to the ground apparently unconscious, and violently convulsed. The fit is now formed, and, in delicate women, the convulsions are easily controlled, but in the strong and plethoric many persons are necessary to restrain the patient, who writhes her body to and fro, agitates her limbs in various directions, and beats her breast repeatedly, commonly the right, with her arm and hand. During the fit the patient also often knocks her head against the bed or floor, tears her hair, screams, shrieks, laughs, cries or sobs alternately. The respiration is slow, and rendered still more laborious by spasms about the pharynx and glottis, so that the patient often grasps her neck and throat, or rubs or strikes the epigastrium and left side with her hand. During this struggle she often bites her own arms or those of the bystanders, and, if left to herself, will sometimes travel all round the room, by means of the gluteal muscles, on her back. The abdomen is often singularly distended with wind; but, in other cases, the abdominal muscles are tense and irregularly contracted. The pulse is, in some cases, increased by the violence of the exertion, but in others its beat is natural. The veins of the neck are distended, the carotids beating with more than usual violence, and the face is flushed. The temperature of the extremities is often lower at the commencement than natural, so as to cause a momentary shivering; but as the paroxysm forms the heat is usually restored and sometimes increased. The phenomena of the subsidence of the paroxysm are very various; sometimes attended by a flood of tears, a fit of laughter, or by an exclamation; and if this is followed by a great flow of limpid urine, the recovery is generally rapid and complete. In other cases the action of the stomach becomes inverted, so that the attendant, perhaps watching the patient with the tenderest sympathy, receives its whole contents in his face, after which she sinks into a profound sleep. In others, again, the fit only partially passes off, and the patient lies, to a certain extent, sensible of what is passing about her, but jaw-locked, the secretions of urine suspended, unable to talk, and obliged to be fed.

The fit having subsided, the patient lies exhausted and unwilling to be disturbed, and although more or less conscious of what has passed, she wishes to be thought ignorant of all that has taken place. A want of consciousness may exist when the fit assumes a severe or epileptic form, but this is not a common symptom of the pure hysterical convulsion. In some few cases the patient is delirious, and makes the most extraordinary noises, as barking; but this is probably feigned. The duration of the fit is very various, or from a few minutes to two, three, or more hours. These fits readily recur, and no sooner is one ended than the patient often falls into another; and in this manner the whole attack may last twelve, twenty-four, or even forty-eight hours. In general the intervals are much longer, not subject to any general law of recurrence, except they are more common about the period of menstruation.

In the interval the symptoms are extremely anomalous and irregular, and more strange and difficult to describe than even those of the paroxysm. Some have their senses so acutely alive, that although the window and bed-curtains may be drawn, still they are pained with light, and the slightest noise distresses them. In some, again, the sense of touch is so exquisite that they can scarcely bear the weight of the bed-clothes; and to others odours are similarly intolerable; so that to—

> "Die of a rose, in aromatic pain,"

is not the mere feigning of the poet's imagination. Besides this extreme acuteness of the senses, others suffer pains under the mammæ, lumbar pains, pains in the hip-joint, headache fixed to one spot, and termed clavus hysterica—palpitation. Pain in the region of the spine is also frequent, and often so intense and so exquisitely increased by pressure that it has often been mistaken for ulceration of the intervertebral cartilages; and Sir B. Brodie has seen numerous instances of young ladies condemned to the horizontal posture, and to the torture of issues and setons for successive years, whom air, exercise, and cheerful occupation would have cured in a few weeks.

As to painful affections of the joints, the same high authority states, that at least four-fifths of the females among the higher classes, who are supposed to labour under diseases of the joints, are suffering from hysteria and from nothing else. The morbid sensibility is chiefly in the integuments, and if they are slightly pinched or drawn from the subjacent parts, the patient complains more than when the head of the femur is pressed against the acetabulum. There is likewise no wasting of the glutei muscles, nor flattening of the nates, nor painful starting of the limbs. In some instances the patient becomes paraplegic in the lower extremities, and is unable to walk, while others suffer temporarily from hemiplegia.

It is the extreme acuteness and exquisite sensibility of the senses in hysteria which has led those less skilled in female arts to believe in the many instances of animal magnetism which have formerly and lately attracted so much public attention. One of the most celebrated of them was enacted a few years ago by Miss M'Evoy, of Liverpool, who, being very hysterical, of exquisite nervous sensibility, and thus enabled to see at very low lights, professed to read with her fingers, a power which many ladies in France have recently claimed, as if the peculiar mechanism of the eye was unnecessary to the formation of the image of external things. The late attempts also to establish the existence of a new nervous principle, or of a mesmeric fluid, are probably entirely founded on that high state of hysteria into which some young women are so easily thrown, and which, in many instances, they can produce at will; and that this will is not wanting in all cases is manifest from the following experience of Dr. Prout:—"Innumerable instances" he says, "have occurred to me, for example, in which calculi have been said to have passed from the kidneys and bladder by hysteric females. Such calculi I have examined, and found to consist, perhaps, of a fragment of silex or of brick; in short, of anything but what is known to be of urinary origin; and the symptoms have been so acurately simulated and described, that those who witnessed them or heard them described have not appeared to doubt of the reality, till the pretended calculus has made its appearance, when its chemical properties have at once dispelled the illusion. Sometimes the properties of the urine have been changed, and it has been mixed with blood or mucus, or with quick-lime or chalk, or with ink."

In investigating, then, cases of hysteria, we should constantly remember that the utmost duplicity and cunning may be displayed, when from mere appearances we should expect nothing but the most rigid truth; in short, the whole energies of the patient's mind are bent on deception; as to the motives for such deception, that is another question. To become an object of attention, an interesting object, is an innate and characteristic feeling of the female mind.

Diagnosis.—The hysteric fit is distinguished from epilepsy by the countenance being much less convulsed, and by the shrieking, laughing, and crying by which hysteria is so constantly interspersed. The foaming of the mouth is also wanting, and the patient in general remembers what has passed during the paroxysm. It is often difficult to distinguish between the many painful affections of the joints which arise from hysteria and the formidable diseases they similate, and many mistakes have been made fatal to the health and even to life. The character, however, of the party, her time of life, her general good health, the intermitting nature of the pain, and its following the course of the nerve, enable us generally to determine with much accuracy between these different classes of disease. The most common mistake, however, is that of considering the pains under the mammæ as pleurisy, or disease of the liver, leading to a sad abuse of bleeding, blistering, and the exhibition of mercury. The state of the pulse, however, the general good health of the party, and most commonly the existence of some uterine irritation, is a sufficient diagnosis between these different diseases.

Prognosis.—The ultimate result of these cases, though often long and tedious, is always favourable. In some few instances insanity has been the result of this highly excited state of feeling, but the instances of this termination are rare.

Treatment.—The treatment may be divided into what should be done during the fit, and into what should be done afterwards.

When the patient falls into a fit the first thing is to loosen her stays and everything tight about her person. The window should be opened and the cold air allowed to blow over her. She should then be laid flat on the bed, or on the floor first, as a means of rendering the circulation through the brain more equal, and again to enable us the more readily to control the convulsive movements of her body. This being done, many modes of further proceeding may be followed. Some recommend, in plethoric cases, that the patient be bled; a remedy certainly in many instances manifestly improper, and in all of doubtful efficacy. When the jaw is locked, an enema, consisting of half a pint to a pint of assafœtida may be thrown up, or, what Dr. Elliotson thinks still better, two or three ounces of oil of turpentine, which in some instances, he adds, instantly removes the affection, but in other cases not for some hours. Another remedy is to fill the mouth with salt: "You generally see them come round if you fill the mouth with salt." The remedy, however, which supersedes all others, and is unquestionably the best, is a good drenching. If the patient be on the bed, the head should be drawn over its side, and a large quantity of water poured on it from a considerable height out of a pail, jug, or other large vessel, and directly over the mouth and nose of the patient, so as to stop her breathing and compel her to open her mouth. This practice is generally introduced into hospitals, and till it was adopted it was not unusual to see three or four patients in hysteria in the same ward, and at the same time. Under that practice, however, an hysterical case is rare, and the fit seldom occurs twice in the same person.

After the paroxysm is over, if the patient complains of continued headache, a few leeches to the temples may be necessary, especially if the urine be small in quantity and high coloured; but in all other cases leeches, blistering, or cupping should be avoided as much as possible, as tending rather to aggravate than control the disease. The next object is to regulate the bowels by such purgatives as may be necessary, and at the same time to support and tranquillize the patient by mild stimulants, as æther or assafœtida, combined with some mild opiate as the tinct. hyoscyami, the syrup of poppies, or small doses of morphia. The state of the uterine functions is next to be inquired into, and if they are defective, salicinæ gr. x. three times a-day, or gr. x. of the citrate of iron should be exhibited ter die. On the contrary, if leucorrhœa be present, or the menstruation be profuse, the mineral acids, or the potassii bitartratis will be found most efficacious by restoring a more healthy state of the deranged organs.

The urine is often suppressed for a time after an attack of hysteria; but unless the bladder be sensibly, and perhaps painfully distended, no attempt should be made to draw it off. Something more should be hazarded to avoid this necessity, for the catheter once passed, that operation will require to be performed morning and night, perhaps, for several months to come.

CATALEPSY

Is a rare form of disease, probably allied to hysteria, but whose laws and modes of treatment are not determined from the infrequency of its occcurrence. It will only be necessary to give a few exemplifications of this singular affection.

Catalepsy is a sudden suspension of all consciousness, and of all voluntary motion; but instead of falling down convulsed, as in hysteria, the patient, on the contrary, maintains the same position of the body, and the same expression of countenance he may chance to have at the moment of seizure; so that if sitting, he continues to sit; if standing, he continues to stand; and if occupied in any mechanical employment, he continues in that attitude; also, if the patient is under the influence of any passion of the mind, the countenance retains that expression—sic manus erecta non delabitur; faciei musculi ad risum aut fletum compositi risum vel fletum constanter exprimunt. This combination of fixed attitude and of unvarying expression gives to the patient the air of a statue rather than of a living being, and he appears as suddenly changed to stone as Niobe after exposure to the sight of Medusa's head. The most remarkable circumstance, however, in this disease is, that the attitude of the body and position of the limbs admit of being changed almost into as many new forms as a painter's lay figure, and the new position, however inconvenient, is preserved till again changed, or until the paroxysm has subsided.

Besides this singular state, all consciousness is suspended, and the patient neither receives any impression from external objects, nor retains any recollection of what has happened during the fit. The organic functions of life, however, continue to be performed, though feebly. The pulse and respiration are regular, only the former is smaller and the latter less frequent than in health. The colour of the countenance is either pale or undergoes no change. The fit may last a few minutes or a few hours, and is said to have lasted three or four days. The patient at length awakes as from sleep, and generally with a deep sigh, when all the functions of the body are suddenly restored. The attack is generally sudden and without any previous symptoms, but it is sometimes preceded by headache, stiffness of the neck, or some obvious torpor of the mind or body. The return of the paroxysm is very uncertain, but the disease seldom subsides with the first attack. The following case, given by Dr. Gooch, will best exemplify this affection.

A lady who laboured habitually under melancholy, a few days after lying-in was seized with catalepsy, and presented the following appearances. She was lying in bed motionless and apparently senseless. It was thought the pupils of her eyes were dilated, and some apprehensions were entertained of effusion on the brain, but on examining them closely it was found they readily contracted when the light fell upon them. Her eyes were open, but there was no rising of the chest, no movement of the nostril, no appearance of respiration. The only signs of life were warmth and a pulse, which was 120 and weak. Her fæces and urine had been voided in bed.

In attempting to rouse her from this senseless state, the trunk of the body was lifted up and placed so far back as to form an obtuse angle with the lower extremities, and in this posture, with nothing to support her, she continued sitting for many minutes. One arm was now raised and then the other, and in the posture they were placed they remained. It was a curious sight to see her sitting up staring lifelessly, her arms outstretched, yet without any visible signs of animation. She was very thin and pallid, and looked like a corpse that had been propped up and stiffened in that attitude. She was now taken out of bed and placed upright, and attempts were made to rouse her by calling loudly in in her ears, but in vain; she stood up, indeed, but as inanimate as a statue. The slightest push put her off her balance, and she made no exertion to regain it, and would have fallen had she not been caught. She went into this state three times: the first lasted fourteen hours, the second twelve hours, and the third nine hours, with waking intervals of three days after the first fit, and of one day after the second; after this time the disease assumed the ordinary form of melancholy.

It might be supposed that something of this might be feigned; but in the following case any suspicion of this kind was impossible. The party seized was an insane male hospital patient. This man was suspected of imposture; when one day, being attacked, he was placed upright on the edge of the cold bath, and gently pushed till he fell to the bottom like a stone, and continued there without the slightest effort to save himself, till it seemed no longer safe to continue the experiment. After continuing in a cataleptic state for many months this man recovered. Some few instances are given in which the patient has retained a partial consciousness during the attack.

No treatment has yet been determined for this complaint.

CHOREA*

Is a singularly irregular convulsive action of the voluntary muscles, especially of the face and extremities, they being either entirely withdrawn from, or but little under the control of, volition. Fifty-four cases are reported to have died of this disease in England and Wales in 1839.

The history of this disease is a sad picture of superstition. As late as the close of the XVth Century, it does not appear to have been studied by physicians, but was supposed to depend on supernatural causes or diabolical possession. In Germany, it was said for two centuries to have been epidemic, and the patients, probably many of them maniacs, to have joined in frantic dances, and as late as 1673 they went in procession to the church of some favourite saint, of whom St. John, St. Guy, and St. Vitus were the most reputed. As physical remedies were supposed to be unavailing in such a disorder, the priests said masses, sung hymns, and sought to exorcise the foul fiend. Paracelsus is said to have recommended the afflicted to mould their own image in wax, to imprecate on it all their sins, and afterwards to burn it till every part was consumed. The moral effects of these methods must have been great, and no doubt many were cured in consequence.

Remote cause.—The disease frequently attacks children otherwise in good health, and without any obvious cause. When any cause is assigned, it is usually terror. Somebody has pretended to cut off the child's head, and perhaps has drawn the back of a knife across her throat; or a person dressed in a white sheet has enacted a spectre or ghost. The causes, therefore, producing this affection are chiefly mental. Mr. Mayo seems to think such a cause may produce the disease in a child yet in utero. A woman in the fourth month of her pregnancy had a frightfully disgusting object thrown at her bosom: she was for two months in a state of extreme nervous illness from this circumstance, but recovered, and went her full time; remarking, however, that the child was extraordinarily lively in the womb, so that she was often overcome with the sensations she experienced. At its birth, the child, a girl, displayed the writhing motions of chorea, and continued up to the time Mr. Mayo saw her, when she was near thirty years of age, looking but an elderly child, with a head remarkably small, and a mind hardly removed from complete idiotcy.

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* Χορος (*Cœtus Saltantium*) St. Vitus', St. John's, or St. Guy's Dance.

Predisposing Causes.—Chorea is limited, or nearly so, to early life, and is rarely seen after twenty. Dr. Heberden states it to be most frequent between the ages of ten and fourteen, and also, that it is more common in the female than in the male, three-fourths of the patients under his care having been females. Dr. Elliotson says the ratio in his practice was eight males to twenty-two females; and these calculations are probably not far from the truth.

Pathology.—This disease is so constantly cured without leaving any trace behind, that it is unquestionably a disease merely of function. Rostan had once an opportunity of examining a woman upwards of fifty, and who, from her childhood, had laboured under chorea of all the left side of the body, and of which the limbs were atrophied. "I expected to find," he says, "atrophy of the right side of the brain, but there was nothing morbid; at least, after a most careful examination, I could see nothing." Dr. Bright has given one case, which he had an opportunity of examining, and which gives equally negative results. It was that of a young woman, aged seventeen, and who had formerly laboured under this disease. She had been free from it for four years, when she formed an attachment, was forsaken, attacked with chorea, and died. The attack was of great severity; she tossed herself about in all directions; bit her tongue, and was with difficulty in any degree controlled. On examination, there was a slight effusion into the arachnoid cavity, more puncta cruenta than usual, and five or six bony plates opposite the cauda equina; phenomena common to every disease of the brain or cord, and of course proving nothing.

Symptoms.—This whimsical disease principally consists in singular and involuntary movements of one or more limbs, which prevent the patient from being able to lay hold with certainty of any given thing, or to carry that thing, be it a spoon or a glass, with any certainty to his mouth, or to any other part. The lower limbs are generally as much affected as the upper, and he can with difficulty walk in a straight line, or if he does, it is always by a series of movements which tend towards the object, counteracted by another series which altogether diverge from it,—his feet turning in and out, upwards and downwards, or in every possible direction. The muscles of the face and neck are sometimes seized with this species of convulsion, when not only is the head tossed about, and the mouth contorted into the most singular grimaces, but it requires two or three persons to feed him, or one or more to hold him, and another to watch the proper moment to pop the food into his mouth. Sometimes the motor nerves of the fifth pair are affected, and then the jaw closes with a loud snap, or his articulation is affected, or the effort of swallowing difficult. Indeed, the patient is agitated by all sorts of odd motions, and has often a vacancy of countenance which gives him a fatuitous appearance. These convulsions are sometimes so violent as to render it necessary to tie him to his chair, or to strap him down when in bed. They are constant during the day, but when asleep, they generally cease altogether. In general, they affect both sides; but in a very few cases, one side only is affected, and the patient is then said to labour under a *hemichorea.* The child's health is generally good; his pulse natural, and his bowels, though occasionally constipated, are by no means uniformly so, but for the most part act regularly.

Diagnosis.—There is no disease which resembles chorea; but the variety hemichorea has been sometimes mistaken for hemiplegia.

Prognosis.—The recovery of the patient, with a very few exceptions, may be always prognosticated.

Treatment.—Sydenham prescribed three or four bleedings for the cure of this disorder, and after the last bleeding he directed the use of cathartics and alteratives until the patient was completely cured; a treatment which has probably been found altogether ineffective, as it has been entirely abandoned. The next heroic mode of treatment was suggested by Dr. Hamilton, of Edinburgh, or that by repeated purgatives; but this method in London, at least, has been also unsuccessful, for although purgatives are occasionally useful, yet, as the basis of the cure, they have been found to do mischief rather than good. The practice, therefore, of the modern school is, for the most part, limited to the exhibition of tonic and stimulant medicines, and to the cold bath. The particular tonic is not of much moment, but in general the mineral tonics are preferred. The sulphate of zinc will cure a large number, beginning with a grain, in the form of a pill, three times a-day, and increasing the dose till it reaches seven or eight grains. This quantity may seem large for a child, but Dr. Elliotson says he has given 20 to 25 grains, three or four times a-day to adults on an empty stomach, and without its causing even nausea. The gradually increasing the dose is essential, for we thus act on the mind, which is, perhaps, of more importance than the addition of power over the body. The influence of the mind in curing chorea was strongly instanced in the use of the nitrate of silver, a medicine which was once prescribed to a great extent at St. Bartholomew's Hospital, for as long as the pupils took a deep interest in the cases by watching the effects of this apparently powerful medicine all the most intractable forms of chorea recovered. No sooner, however, was it shown that the nitrate of silver was readily decomposed by the saliva, and consequently rendered nearly harmless, and the pupils less anxious about its results, than all its good effects suddenly vanished, so that it has ceased to be, or nearly so, employed for the cure of this disease.

The sub-carbonate of iron has an equal if not a greater effect over the disease with zinc, and Dr. Elliotson thinks he has cured 40 cases in succession with it. He recommends it to be given from six weeks to two months, in drachm doses, and mixed with double its weight of treacle; and children, he says, after a time like it.

Of other classes of stimuli, camphor in five-grain doses has acquired much reputation. Many young women, also, who attribute the attack to fright, get well under so simple a treatment as misturæ camphoræ, and spiritus ætheris nitrici, ʒ j. ter die; and when they labour under amenorrhœa, salicinæ gr. x. ter die is equally or more beneficial. A few cases have done well under nucis vomicæ, gr. ij. ter die, but the catalogue of possible remedies is endless. In many instances, however, the above medicines are continued for weeks without any manifest improvement, and in these cases the cold bath, or the cold shower bath is an excellent adjuvant, and, except the child is suffering from some structural disease, the case uniformly yields to this conjoined treatment.

Dietetic Treatment.—The diet should be light and nourishing.

TETANUS (τεινω) *extendo*—

Is a continued spasm of the muscles of the jaw, generally accompanied by intermitting spasm, either of all the voluntary muscles, or else of all the flexors, or of all the extensors of the body.

This disease was known to the ancients, and is described by Aretæus with all his usual terseness and precision. It is the frightful accompaniment of wars and battles, but occurs from accidents, or else spontaneously in a few instances in civil life, so that 122 cases are reported to have died from this disease in 1839 in England and Wales.

Remote Cause.—This disease is most frequently met with in armies on actual service, and is the result of wounds, especially of wounds made by large projectiles, as cannon-balls, bombs, &c., or of the amputations rendered necessary by those wounds. It follows also strains and contusions, and it is principally from these latter causes that it is met with in civil life.

Most authors consider it to be most common in hot variable climates, as that of Egypt. After the battle of the Pyramids, says Baron Larrey, upwards of 500 of the wounded were attacked with tetanus. The same authority also adds, that the tetanus of Egypt was much more intense than that he had observed in Germany. He states also, that this disease is much more common in all countries at those times of the year when the temperature passes rapidly from one extreme to the other, or in the spring, than in seasons when the temperature is more equal. Thus, after the battle of Eylau, fought during the depth of winter, not one of the guard, and very few of the line, were seized with this affection.

Besides wounds, strains, and contusions, some morbid poisons appear to produce this affection. Two men descended into a soap-boiler's vat to clean it out: on reaching the bottom, they both fell down in convulsions. They were quickly rescued, when it was discovered that a portion of sulphuretted hydrogen had been generated, and remained at the bottom of the vat. Both of these persons were seized with tetanus, of which they died. Strychnine is another poison also well known to produce this affection, and the poison of cholera, in severe cases, has also had the same result.

Predisposing Causes.—As the wound is the remote cause of tetanus, so its nature appears to predispose to the disease. Thus it is most common after injuries of the ginglymoid joints, as that of the elbow or knee, or when the bone is extensively fractured or comminuted. Its occurrence is also more probable if a foreign body remains in the wound, and especially if, after amputation, a nerve has been included in the ligature round the artery. In other respects, the state of the wound does not appear to influence the attack, for it appears to take place equally whether it be open or cicatrized, granulating or suppurating, incised or contused; but if there be any difference, Larrey thinks the detaching of the eschar, especially if the stump be exposed to cold, is the most critical period. It is singular, however, that time destroys the predisposition given by the wound; for Sir James Macgrigor gives as the result of his great experience, that no person is attacked with tetanus after the 22nd day from receiving the wound, a period which Sir Gilbert Blane extends to the fourth week.

All ages are liable to this disease, and even new-born children suffer from it, the "trismus nascentium" being ascribed to the tying of the navel-string. Tumbling boys are also frequently seized with this complaint. It is most common, however, in adult age; and if less frequent in old age, this circumstance is probably owing to persons in advanced life being little exposed to those accidents which usually produce it. Both sexes suffer from it; but men far more commonly than women. The ratio that died in 1839 was 102 men to 20 women.

Pathology.—The body has often been most minutely examined, after the patient has fallen from idiopathic tetanus, without any lesion being discovered; and when he has sunk from traumatic tetanus, nothing has been found in many instances, except, perhaps, the primary superficial wound. In a few cases the membranes of the brain have been found congested; but not in a greater degree than might have been predicated from the violent and long-continued muscular action incident to the disease. In a smaller number of instances small patches of cartilages or of bony matter have been found on the spinal arachnoid membrane; but as these are often absent, they are not essential conditions of the disease. It seems proved, therefore, that tetanus is a disease of function; and, as Majendie has shown, if the spinal cord of a living animal be divided into as many segments as there are vertebræ, that the animal, if poisoned with strychnine, still becomes tetanic, although all direct connexion of the muscles with the brain is destroyed; it seems probable that the cord, as high as the fifth pair, and not the brain, must be the great seat of this affection.

Symptoms.—There are five varieties of tetanus—or trismus, tetanos, emprosthotonos, opisthotonos, and pleurosthotonos; and when either of these diseases terminates within eight days, it is said to be acute; but if prolonged beyond that time it is termed chronic.

Trismus is that state in which the disease is limited to the muscles of the lower jaw and throat. Tetanos is marked by the flexor and extensor muscles of the body generally being equally and strongly contracted, keeping the whole frame in such a state of tension that if you attempt to raise the leg, you, according to Baron Larrey, raise the whole body, it being as inflexible as in death. Emprosthotonos is when the flexor muscles bend the body forwards. Opisthotonos when they bend the body backwards; and pleurosthotonos is when they bend it laterally, or on one side only.

The frequency of occurrence of these different forms of tetanus is not accurately determined; but trismus is the most common: and though it may exist *per se*, it is generally the first and concomitant symptoms of all the other forms. After trismus, opisthotonos is far the most common, both in this country and throughout Europe; but Baron Larrey says that emprosthotonos was most common in Egypt. Of pleurosthotonos only a very small number of cases are to be found recorded in the whole annals of medicine.

The attack of either form of tetanus may be sudden; but more frequently it is preceded by an uneasy sensation and tension of the præcordia, followed by stiffness of the neck, shoulders, and lower jaw. At length the patient feels a sudden and painful traction of the ensiform cartilage; and this latter symptom is considered the pathognomic sign of the disease. Shortly after this the jaw becomes locked, and cannot be opened even to admit the little finger. At this point the disease may stop, and the phenomena be limited to trismus; but more commonly the patient takes to his bed, and the disease assumes one of its severe forms, as of opisthotonos, emprosthotonos, pleurosthotonos, or of tetanus.

In opisthotonos, in addition to the trismus, the muscles of the face are generally spasmodically affected, for the brow is knit, the corners of the mouth are drawn, giving to the patient a most wretched grin, or the risus sardonicus. The eyes also are almost motionless and sunk in the socket; and, during the attack, the tongue is projected against the teeth, so, except for the trismus, it might be caught by a convulsive snapping of the jaws, and severely injured. The characteristic of this form of the disease, however, is, that the flexors of the back are thrown into such powerful action that the spine becomes arched, and sometimes to such a degree that the body rests on the occiput and heels, as on the extreme points of the segment of a circle. The flexors of the back, however, are not the only muscles affected, for the shoulders are thrust forward by a strong action of the pectoral muscles, while the extremities are elongated and tightly braced by strong contractions both of their flexors and extensors. Indeed, the whole of these different sets of muscles are thrown into action at the same moment, as if by the discharge of a powerful galvanic battery. The shock is transitory; and, having passed off, an interval succeeds which varies from a few minutes to half an hour, an hour, two hours, or longer, according to the severity of the disease. But during this interval the patient lies as in his coffin, with his arms close to his sides, and his legs stretched out and touching each other, fearing lest the slightest motion should produce a recurrence of the attack. His nights, or such few as he lives through, are sleepless, or only marked by a few minutes broken slumber. Such is an attack of opisthotonos. The other forms of the disease differ only by the different sets of muscles affected.

It is difficult to give an idea of the distressing violence of the spasms; but they may be imagined when it is stated that Desportes gives a case in which both thighs were broken. But notwithstanding this strongly powerful action of the muscles, the patient's mind is seldom affected, and his pulse presents its healthy beat, only a little accelerated. The intercostal muscles partaking in the general spasm, the respiration is carried on principally by the diaphragm; and, when the attacks are frequent, the breathing is short and laborious. The skin is, after a short time, covered with a profuse sweat, as during great exertion. The tongue is clean and moist; but the bowels are generally constipated, and the sphincter ani so contracted, that it is difficult to introduce a glyster-pipe. In cases in which tetanus supervenes on a suppurating wound, the sore dries up and is painful, while the muscles of the part are highly irritable.

In mild cases the paroxysm returns only three or four times in the twenty-four hours; while in severe cases it returns not only every hour or every quarter of an hour, but every motion of the body or attempt to open the mouth is followed by an attack. In the last stage the situation of the patient is most pitiable, the spasm returning every few minutes, till he is at last cut off by one of unusual violence.

The duration of this disease is very various; in some instances death occurs in twenty-four hours; more commonly on the second, third, and fourth day, and, when fatal, is seldom protracted beyond the eighth. Some few persons survive till the seventeenth or twentieth day; and in this case the disease generally terminates in recovery.

Diagnosis.—The jaw is sometimes locked by enlargement of the cervical glands, and also in some forms of hysteria. The tumor, however, in the one case, and the hysteric passion in the other, are circumstances which readily enable us to distinguish them from trismus. The formidable phenomena of tetanus is seen in no other disorder except cholera; but the other differences between the two diseases are so extremely marked, that it is impossible not to distinguish them.

Prognosis.—The prognosis in this disease is always most grave. In the Peninsular war, although hundreds of cases were treated in every different manner, yet few, very few survived. In civil life the chances are something more favourable; and if the accident be of little moment, and the patient very young, he sometimes recovers. Dr. Parry thinks, if the pulse be not more than 100 or 110 up to the fourth or fifth day, the patient almost always recovers. The danger decreases in general also in proportion to the duration of the disease, for few patients die after the fourteenth day. The danger in the early stages is to be estimated by the frequency and violence of the paroxysm.

Treatment.—Baron Larrey affirms that this disease, if left to nature, is quickly fatal.

One of the most remarkable features of this complaint is the insensibility of the brain and nervous system generally to the action of our most powerful remedies; so that they are not merely inefficacious, but almost inert. Sir James Macgrigor says that all the most powerful remedies were fully tried in the Peninsular war; and that little or no dependence could be placed on any of them. Opium was largely tried after the battle of Albuera, and given in the enormous dose of twenty grains every three hours; and yet it not only failed in curing the disease, but did not even produce sleep. Mercury was tried after the battle of Salamanca, and to such a degree, that strong mercurial ointment was rubbed in three times a-day in unlimited quantity, yet it entirely failed. One man, strongly under the influence of mercury, was seized with tetanus and died. While Baron Larrey's experience in Egypt led him to believe that mercurial frictions only aggravated the disease. Opium and mercury were then combined; but, according to Sir James Macgrigor, the combination was as inefficacious as their separate exhibition. Wine and brandy were used in unlimited quantity; but without producing intoxication, or mitigating the symptoms. Many other stimulants, as musk, æther, camphor, were afterwards employed, but equally without success. Venæsection had also a fair trial in several quarters, and in a great number of cases; but only one man recovered. Tobacco glysters are not only not serviceable, but have been sometimes followed by the instant death of the patient. Digitalis has equally disappointed the hope which had been entertained of it; and one man is said to have died under its depressing influence. Prussic acid has also been tried and failed. Dr. Elliotson speaks in high terms of the carbonate of iron; and he has given it to the extent of 2 lbs. in the twenty-four hours; and under this treatment two out of three cases recovered. The instances, however, are far too few to enable us to decide on the value of this medicine, especially as a very long period has elapsed without any confirmatory evidence. The warm bath has been thought serviceable in some cases; but patients have died while immersed in it. The cold bath is worse than useless; it is dangerous. Baron Larrey speaks of a patient who had twice gone into the cold bath, but with so little benefit that he absolutely refused to encounter a third. A blanket, however, was thrown over his head, and he was then plunged into the water. He died a few hours after, when it was discovered he had ruptured the sterno-pubian muscle in all its thickness. Dr. Elliotson speaks of a case in which the patient was taken out of bed and placed in a tub in the middle of the ward, when a pail or two of water was dashed over him. The man fell down dead as if he were shot.

It appears, then, that all the heroic modes of treatment medicine offers have been tried and failed. Much good, however, is gained by attempting to restore, especially in idiopathic tetanos, the secretions to a healthy state; also by supporting the patient, and by endeavouring to tranquillize the high irritation under which he is labouring. In St. Thomas's and in St. Bartholomew's Hospitals several cases have been restored by this means. The medicines employed were moderate doses of purgative medicines, with tinct. opii ♏ v., or its equivalent, 10 grains of Dover's powder, given every three or four hours; and these were conjoined with moderate quantities of wine, sago, or other nutritious diet. Musk also, in ten-grain doses, has been given with some advantage.

Some authors lay much stress on a local treatment in traumatic tetanus. Baron Larrey, as the result of his great experience, says, "When it is caused by the wound, we should not hesitate to operate on the first symptom of tetanus, and thus, as far as possible, remove the causes of irritation. If tetanus follows amputation, &c., he recommends the stump to be sprinkled with powdered cantharides; and in cases where a nerve has been included in the ligature, that the ligature be removed either by section, or by actual cautery. In the British army, however, all these proceedings have been adopted, and with very little success, for amputation has been frequently performed without any mitigation of the symptoms. The wound has also been excised, submitted to actual cautery, been blistered, and dressed with every ointment; but in general the disease has run its course, either uninfluenced, or else its fatal termination has been accelerated. Hennen has even seen the wound heal and the patient die on the same day. Nothing, in fact, is so unsatisfactory as the results yet obtained from either the general or local treatment of this fatal affection. Larrey has often attempted, from the difficulty of swallowing fluids that sometimes attends this complaint, to pass an elastic tube; but in all cases he says he met with a contracted state of the œsophagus impossible to overcome; while the attempt was constantly followed by the immediate occurrence of the severest spasmodic attacks.

NEURALGIA.

Besides the functional diseases that have been mentioned of the brain and cord, the nerves they give origin to are likewise often the seat of functional disease. Thus the nerves of sensation are frequently the seat of excruciating pain, ever returning, and this affection is termed Neuralgia. If from any cause the sensation of a part is dull, benumbed, or entirely lost, the disease is termed Anæsthesia. On the contrary, if there be an entire loss of motion in a part, the disease is termed Paralysis; or, if the action of the part be irregular and violent, it is termed Spasm or Cramp.

OF NEURALGIA OR TIC DOULOUREUX.

This disease of the nerves was known to Galen; but the more complete development of this branch of medicine is of modern date, and is owing very principally to the labours of Parry and Jenner, of Chaussière, of Sir Charles Bell and Mr. Mayo. No death is reported of this disease in England and Wales in 1839.

Remote Cause.—The remote causes of this class of affections are extremely undetermined, but they are supposed to be extremes of heat or cold—or sudden changes from the one to the other. It is also often a result of impaired general health. Thus women after profuse menorrhagia, or after child-birth, or persons recovering from fever or other severe disease, often suffer from neuralgic affections. Arsenic also appears to be a cause; at least persons who have attempted to poison themselves with that mineral often suffer agonizing pains in the limbs. Blows or wounds, or the pressure of an aneurismal or other tumor, sometimes seated in the nerve itself, are also causes of neuralgia.

Predisposing Causes.—Of 123 cases observed or collected by M. Chaponière, only two cases occurred in children under ten years of age. Tic douloureux seldom therefore occurs before puberty. An equal number is supposed to occur in each ten years of the period between twenty and sixty, showing the great tendency to increase with age. As to sex, this disease is more common in men than in women; and in women it occurs rather more frequently before thirty than afterwards, especially in those whose menstruation is irregular either as to time or quantity. The place of abode, manner of living, trade or profession, and as far as has been traced, hereditary predisposition, have little influence on the production of the disease.

Pathology.—Sir Charles Bell and Majendie have carefully examined the affected nerves after death in neuralgia and found them healthy. In some few instances, some morbid appearances have been observed, but only such as are probably accidental, or the consequences of the disease itself, as redness or atrophy of the nerve. On examining the head of the late Dr. Pemberton, for example, there was found an unusual thickness of the os frontis, and also a little ossific deposition in the falciform process. In another case, also, Sir Henry Halford has observed a similar thickening of the frontal, ethmoidal, and sphenoidal bones. But osseous formations in the dura mater, and also thickening of the bones of the cranium, are often met with without any symptoms of tic douloureux. Painful affections of the nerves have also occasionally occurred in consequence of cancer or other diseased structure of the brain, but not necessarily so. The labours of the anatomist have therefore thrown little light on this affection, and consequently the essential nature of neuralgia is merely a disordered function of the nerve.

Symptoms.—All authors have observed that the most superficial nerves are those which are principally if not solely affected with this disease; and of those nerves the following are the most frequently so:—

Numbers attacked.		Systems of Nerves.	Particular Seat.
Men.	Women.		
124	142	Trifacial nerve.	Supra-orbitary nerve. Infra-orbitary. Inferior maxillary. Nasal } rare. Temporal } rare.
9	9	Cervico-occipital.	Occipital. Mastoidean.
		Brachial.	Cubital. Musculo-cutanei. Radial. Median: very rare.
	Women in large numbers.	Dorso-intercostales.	Dorsal. Intercostal.
		Lumbo-abdominalis.	Lumbar. Ilio-scrotal.
		Crural.	Tibial.
75	52	Femoro-popliteal	Femoro-popliteal. Peroneal nerve. External plantar nerve. Internal plantar nerve.

The symptoms of tic douloureux are similar, whatever be the nerve affected; it is therefore proposed only to treat of those of the trifacial, as being the more usual seat of this trying complaint.

The most common seat of tic douloureux is the fifth pair of nerves, or the nerves which give sensation to the face; and the frequency with which its different branches are attacked is in the following order. The infra-orbital or pes anserinus, the supra-orbital, and lastly, the inferior maxillary nerve. These branches may be attacked separately or conjointly; most commonly, however, only one branch is affected, less frequently two, and the case must be severe in which the three branches or the whole side of the face is affected.

The attack of this disease is sometimes sudden, but more generally it is preceded by a dull aching pain at the points where the nerve issues from the cranium or becomes superficial. After this threatening symptom has lasted a few hours or a few days, the patient is seized with a violent darting or shooting pain in the course of the nerve, returning at intervals, and which is the characteristic of the disease. The paroxym is short, lasting only a few seconds or a few minutes, but the pain is perhaps the most severe that the human frame is capable of suffering. Some patients have compared it to an electric shock of great intensity, others to the conflagration of gunpowder, and others to the intensity and violence of a fulminating powder. The late Dr. Pemberton was known to have stamped the bottom of his carriage out during the paroxysm; and Valleix mentions a physician who, suffering from this disease, was induced, by excessive agony, to make deep incisions into his face, and then to apply actual cautery to the wound; but his pain not being mitigated by these methods, he several times attempted suicide. Even in mild cases, the patient often on the instant of attack becomes fixed like a statue, fearing to move a muscle or a limb lest he should aggravate the pain or reproduce the seizure.

In cases of ordinary intensity the effect is so completely limited to the nerve that even the skin is not discoloured, while the organs immediately in connexion with it are little affected, the eye perhaps being only watery, the nose hot, and the teeth aching. In severer cases, however, and where the disease affects the nerve generally, the condition of the patient is most lamentable. The mouth is spasmodically drawn as in palsy, so that the saliva flows over the chin and neck. That fluid also is increased in quantity and altered in quality; for in cases in which the patient is afraid to clean his teeth lest the paroxym should return, the whole of the teeth of the lower jaw have become so incrusted with tartar as to form one solid mass. The eye and eyelid are likewise frequently convulsed, the conjunctiva injected, the nose discharges a muciform matter, the very hair of the head is painful, and the affected nerve may be traced by a red line marking its course.

The recurrence of the paroxysm is very various: in slight cases it may return only once in a few weeks, or in a few days; but in severe cases it will return every quarter of an hour, every five minutes, or every minute, and even every few seconds. In a few cases (ten out of forty-six) the paroxysms occurred periodically and at stated intervals. Yet in general the times of recurrence are very uncertain, sometimes the patient being attacked with great violence many times a day for many days or weeks together, so that the disease is almost continued; and then it intermits for a week, a month, six months, or a year.

It has been imagined by Bellingeri that the attack usually takes place before the middle of the day, but this rule is liable to many exceptions, for it often occurs in the night as well as at all times of the day. The disease is situated nearly as often on the right as on the left side of the face, or, according to Valleix, twenty-three times on the right and twenty-one times on the left, and only twice on both sides of the face. Pressure over the diseased nerve rarely increased the pain, or only in three cases out of twenty-one.

The total duration of the disease is very various. In some cases it terminates after a few paroxysms, in others it lasts from one to six months, and in some cases it becomes chronic and lasts the whole period of a long life. It seldom disappears suddenly, but oscillates with a decreasing intensity; the intervals gradually becoming lengthened till at last the disease subsides.

Diagnosis.—The disease to which neuralgia bears most resemblance is rheumatism, but it is distinguished from it by the transitory nature of the attack and by the absence of all swelling. Valleix gives also as a diagnostic symptom, that there are certain points which, being pressed in the interval of the paroxysm, give pain. These points are four-fold, or 1st, Where the nerve emerges from the bone, as at the supra-infra-orbitary, and mental foramina, in trifacial neuralgia. 2ndly. Where the nerve, passing through muscles, reaches the skin. 3rdly. Where the nerve terminates in the skin; and lastly, where the nerve becomes very superficial, as the cubital and peroneal nerves.

Prognosis.—This disease has very rarely terminated in death, and in general the patient's health is good throughout its whole course.

Treatment. — Almost every practitioner has some specific mode of treatment for this disease. The late Dr. Baillie recommended sarsaparilla,—Mr. Hutchinson the sulphate of iron, — Dr. Elliotson the carbonate of iron, — others have greatly praised arsenic, — others mercury, or the disulphate of quina. Bleeding, either local or general, has had its advocates, while its opponents affirm this operation to be always useless and sometimes injurious. There can be no question that the disease has often subsided under the use of all these various remedies; but the tendency in neuralgia to a spontaneous intermission is so great, it is doubtful whether in any case they can be said to have cured it. Opiates are unquestionably serviceable in mitigating the sufferings of the patient, and perhaps in influencing the disease, but not to the extent generally supposed. "Belladonna, both internally and as a plaster, will relieve the pain; and some persons," says Dr. Elliotson (note, p. 507), "have *said* they have seen it cured by it. Stramonium and opium have a similar effect; but in general you may give these things till you induce vertigo and apoplexy, and yet the pain will get no better. Belladonna and perhaps stramonium are better than opium, and they appear to have done occasionally good."

When these or other general remedies have proved insufficient, recourse has been had to local remedies. The most efficient of these applications is supposed to be the ungentum aconitinæ, or else an ointment of morphia, and likewise blisters, and the disease has often subsided under their use. Steaming the head, and the warm bath, are equally or even more beneficial. The belladonna plaster is a most favourite application.

When general and local applications are unsuccessful, the cause is often sought in a diseased tooth or stump, and in a *very few* instances an exostosis of the stump has been discovered and the disease cured. More commonly, however, even when the patient submits to have every tooth in his head drawn, no relief or benefit has resulted.

Besides extracting the teeth, a last resource is, dividing the nerve; but even this operation is very uncertain. Complete division of the nerve, with excision of a portion of it, so as to prevent union by the first intention, has been practised over and over again, but with only temporary benefit. The division of the nerve also has this disadvantage, that when most successful it is often followed by numbness and loss of power of the part affected, but the more distressing circumstance is, that the neuralgia has so frequently returned that few surgeons are now inclined to operate for the disease. In some few instances, when the neuralgia has been the result of a puncture, the removal of the cicatrix has cured the patient; but there are many exceptions to the success even of this operation.

ANÆSTHESIA, OR PALSY OF THE NERVES OF SENSATION.

An excess of sensibility of the nerves is the characteristic of neuralgia, but the nerves of sensation may suffer from a directly opposite state, or from a defect of sensibility—a numbness or a complete loss of sensation. The cutaneous nerves are those most usually affected, and from this cause the disease most usually attacks the integuments of a portion of the trunk, or of an arm, or a leg, or some given portion of the extremities, and also the whole face or parts of the face, indicating an affection of the fifth pair.

As the remote and predisposing causes of this disease, as also its seat, are similar to those of neuralgia, so its pathology, likewise, is equally negative, or with no other peculiarity than being more frequently connected with disease of the brain. As the symptoms, moreover, are so marked that it is impossible to mistake them, it seems unnecessary to do more than to point out two remarkable laws incident to this form of the disease. The first is, that parts do not waste in anæsthesia as in muscular palsy, which is singular, for the nerves of sensation and of motion, with the exception of the fifth pair, appear throughout the body to be inseparably connected and contained in the same sheath. The second law is, that in anæsthesia, the nerve affected, though insensible as to touch, still remains sensible to changes of temperature. The treatment of anæsthesia, unless the disease be connected with the brain or spinal cord, principally resolves itself into attention to the general health.

The diseases of the nerves of motion are—*Paralysis, Paralysis Agitans, and Spasm.*

OF PARALYSIS OF THE NERVES OF MOTION.

Palsy of a part is a very constant symptom of structural disease of the brain or of the spinal cord, but it occasionally happens from mere diseased function of the nerve itself. Palsy, from this cause, may affect a finger, a hand, an arm, or a leg; but its most frequent seat is the seventh pair or facial nerve. Two cases of this kind were recently admitted into St. Thomas's Hospital, in which the brow was motionless, the mouth drawn, and with the eye red from inability to close the lid. In severer cases, the lower eyelid is everted and the tears flow over the cheek. The eye, if the disease be prolonged, inflames either from its constant exposure to light, or from the presence of other irritating causes removed in health by the action of the eyelids. The eye, also, is sometimes turned outwards from palsy of the third pair, and sometimes inwards from a similar affection of the external motor of the eye. When the third pair is palsied, the upper eyelid, to which it sends branches, often falls down, covering the eye entirely, and is so completely powerless that it cannot be raised except by the hand; and this state is termed *ptosis*. Sometimes the nostril, also, is motionless and flattened. This disease arises from cold damp weather, mechanical violence, or other general cause. It seldom occurs till adult age. No further pathological phenomena or symptoms attend it. The treatment is by blisters behind the ear, and by attention to the general health.

Paralysis Agitans is a minor affection of this class, and consists of a feeble trembling action of the muscles, not amounting to palsy. The nervous fluid is consequently not altogether wanting, but is deficient in quantity, and exhausted by the slightest action of the muscles, as in old persons. This disease is met with most commonly among gilders and silverers of looking-glasses, and the class of persons who work with mercury. It is also frequent in the drunkard, in the aged, and in persons who have suffered from cerebral or spinal structural affections; it consequently seldom attacks young persons, but is most usual between the ages of 40 and 60. The bodies of those who have fallen from this disease have been examined; but, except in those cases in which it has depended on cerebral or spinal lesions, no pathological phenomena have been found. This muscular weakness may be general or partial. When general, almost every fibre quivers, so that to raise any liquid to the mouth without spilling it is impossible; and if the patient attempts to walk, he steps short and quick, treads on his own toes, and is almost obliged to run to keep himself from falling. When the disease is partial, the head often shakes like that of a Chinese mandarin, or one hand or arm may be in incessant motion. In one case lately, in St. Thomas's Hospital, the patient, a man about 30,

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beat the devil's tatoo with his left leg, whether sleeping or awake, for many weeks, to the great annoyance of the whole ward.

Paralysis agitans is a very obstinate disease; and Dr. Elliotson does but speak the sense of the profession when he says, "I have not been by any means successful in the treatment of this disease. I believe, when it occurs in old people (when the hand shakes, or the head), you can do no good; at least, I have never known good done. Where it has occurred pretty universally, I have never been able to cure but one case, and in that instance the patient was not old; he was not above 35 years of age. After using other remedies unsuccessfully, I then exhibited sub-carbonate of iron, under the employment of which he became pretty well, and remained so for some time afterwards. I have since had four or five other cases under my care, and have exhibited the same medicine, but it has not produced the least benefit."

Spasm—Cramp.

Many persons are habitually subject to a spasmodic action, or tic, of some one muscle of the face. When the contraction, however, of the affected muscle is attended with pain, it is termed *cramp*. Many persons, and of all ages and of both sexes, are greatly subject to cramp; and the parts it most commonly affects are the arms or legs, or the abdominal muscles, and especially the rectus. It is most commonly excited by cold; and, from this circumstance, so many young persons are drowned, seized with cramp while swimming. It also often occurs during sleep, and while the patient is warm in bed. It is produced, also, by causes which greatly exhaust the nervous power. Thus, women are often seized, either immediately after or during parturition; it also often occurs in the course of a severe diarrhœa. No pathological lesion attends this affection. The symptoms are manifest. The return of the attack, in ordinary cases, is extremely uncertain, and so is its duration when present. It seldom, however, lasts more than a few minutes, though occasionally its duration is much longer. The treatment of this affection appears to be, first to rub the part, and then to apply warmth when it is caused by cold, and cold when it is caused by warmth, and to throw the whole weight of the body on the leg or other affected part, so as to overcome the spasmodic action of the muscles. If the disease be distressingly frequent, the treatment consists of baths, friction either with the flesh-brush or else some stimulating liniment containing an opiate, and also by attention to the general health.

Of the Neuroses of the Alimentary Canal.

The importance of healthy digestion, and consequently of a healthy state of the digestive organs, for the preparation of our food, has been acknowledged by all writers; and, indeed, Mr. Hunter, on this account, appears to have considered the stomach as the great centre of animal life. The diseases, however, of this system are numerous, and have employed the pens of an endless number of writers; and by none have they been better treated than by those of our own times, as Philip, Pront, Abercrombie, Mayo, and Johnson.

Remote Causes.—The remote causes of these affections are very multifarious, and may be divided into *general* and *specific.* The general causes are errors in the quantity, quality, or temperature of our diet. Atmospheric vicissitudes, the play of the passions, and chemical or mechanical injuries. The specific causes are perhaps endless; but there are four of more importance than the rest,—alcohol (however combined, whether with beer, wine, or drank as spirits), lead, salted provisions, and some fish poisons; and of these it is proposed to treat at some length. In addition to these general and specific causes, we may perhaps, without impropriety, add intestinal worms, calcareous, biliary, as well as certain organic intestinal concretions.

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Predisposing Causes.—The present state of the constitution greatly influences the functions of the alimentary canal, for there exists that sympathy between it and every other part of the body that the one is seldom disordered but the other immediately suffers. Almost every disease, therefore, whether an ulcer of the leg, an eruption of the skin, an abscess of the liver, or a headache very constantly, deranges or destroys the healthy functions of digestion.

Age has also much influence, as a predisposing cause, over this class of disease. The infant cannot live on the food which nourishes the child, the child on the diet of the adult; and again, in old age, we can hardly masticate or digest with facility the diet of our early years. Each age has therefore its appropriate nourishment; but slight errors are felt much more seriously in the extremes of life than at its adult and middle portion. The *habits* of life affect the powers of digestion almost as much as age, for the hardy countryman often lives on food which would destroy the effeminate townsman. *Sex* has also much influence in producing disordered states of the digestive organs. The female eats, perhaps, oftener than the male, but her appetite is more delicate, and her sedentary habits are unfavourable to digestion. Having thus briefly mentioned the *causes*, generally, of the neuroses of the alimentary canal, it will now be necessary to speak of its particular disorders, and of their particular causes; and first, of Dysphagia.

Dysphagia.—The œsophagus is a fibrous canal by which the food descends from the mouth into the stomach, and is sometimes so irritable and sometimes so completely void of power, so palsied, that it opposes an obstacle to the introduction of either solid or liquid food into the stomach; and this difficulty of swallowing is termed dysphagia.

The causes producing difficult deglutition are in general connected with some previous state of ill health, as phthisis. It is not uncommonly a consequence of mental affections, as of hysteria or insanity, the latter class of persons often falling from a sudden palsy of the œsophagus, so that the food being retarded in its passage at the root of the tongue, makes its way into the larynx. A case of dysphagia is now in St. Thomas's, caused by a bony enlargement of the thyroid gland; and any other tumor, external or internal, pressing on the œsophagus, will equally produce a similar result. It will only be in our power to give an example or two of this affection.

A woman was admitted into one of the large hospitals in London, complaining of an entire impossibility of passing anything into her stomach, and that whatever she attempted to swallow was immediately returned. A probang was passed, and as it was stopped before it reached the stomach it was supposed she was labouring under cancer of the œsophagus; an opinion which was the more strongly confirmed, as she became daily more and more emaciated. At length, however, at the end of many days, she made an effort to vomit, and threw up a piece of beef of considerable size, and which she now remembered she was eating when first seized. She entirely recovered; and consequently a permanent spasm of the œsophagus must have existed in this person for a great many days.

Mr. Hunter gives a case of palsy of the muscles of deglutition so complete that the patient was obliged to be supported by nourishment injected into the stomach by means of an elastic tube. She, however, recovered, and, as Mr. Hunter imagined, by taking a drachm of valerian and two scruples of flour of mustard daily. Pinel gives a case of one of the nurses of Salpêtrière, aged sixty, who laboured for six months under a violent dysphagia; and Hoffman describes also a similar case. It is remarkable that both these cases were cured by accident; for Pinel had ordered a drachm of camphor to be rubbed up with olive oil and used as a liniment, when by mistake the woman took the entire quantity in the course of the night; while Hoffman had ordered for his case half a drachm of camphor to be rubbed up in the same manner, and to be taken in divided doses; but the woman took the whole quantity at one draught.

The *Neuroses* of the stomach, from general causes, may be divided into those which, as far as we know, are unaccompanied by any morbid secretion, and into those in which the secretions are vitiated; although it must be admitted the two forms of disease often coexist. The former, however, embraces gastralgia, emesis, ruminatio, pica, bulimia, abstinentia, and polydipsia. The latter includes cardialgia, pyrosis, cholera vulgaris, and pneumatosis.

Gastralgia, or stomach *Colic*, is a severe pain in the stomach, often so completely idiopathic that the slightest cause produces it. One person cannot eat a strawberry, another a gooseberry, another an egg, without being seized with it. In other cases, every sort of diet produces it, so that the patient is racked with pain after every meal. The parties affected are usually adults; and women are more frequently the subject of it than men.

The attack of *colic* is generally sudden, and the patient unexpectedly seized with a pain in the stomach, which attains its greatest height on the instant. This pain is so violent that it either bends him double, causes him to roll on the floor, or else to lie flat on his belly, making strong pressure on the abdomen, and which pressure he fortunately finds gives him relief. This attack is generally accompanied by sickness or vomiting, by great flatulence, and by a confined or purged state of the bowels. It may last from a few minutes to a few hours, and often ceases as soon as the stomach is emptied or the bowels have acted; but when the patient is costive, it very constantly continues till he is relieved by medicine, when it subsides almost as rapidly as it commenced, leaving however a soreness behind it. The pulse, in this affection, is natural; there is no fever, and the pain is relieved on pressure; circumstances which readily distinguish it from inflammation. The disease may subside after one attack; but genuine gastralgia sometimes lasts for many months, as in the following case:—

Barras, author of the "Traité sur les Gastralgies," was subject to neuralgia of the face and spermatic cord, when he was one day seized, two or three hours after eating, with a pain in the stomach, as if that viscus was compressed in a vice; he also felt much nausca. These symptoms having lasted for some time, ceased with the eructation of a great quantity of wind. Similar attacks recurred at short intervals, during some months, and were so intolerable that he became emaciated, hypochondriacal, and disgusted with life. He applied a great number of leeches to the epigastrium, and took a great variety of medicines without relief, but was at last cured by the shock caused by the death of his daughter. The treatment of this disease is by mild opiates and gentle cathartics.

Besides being the seat of most severe pain, the nerves of the stomach may be morbidly sensible as to the quality of things eaten, as in pica; or as to the quantity of food, as in bulimia, polydipsia, and in anorexia.

*Pica** is a depravation of appetite, so that the patient desires to eat substances more or less unnatural; or, as it is usually termed, has "a longing." The causes of this affection are not determined; but the parties usually affected are pregnant women, the insane, and chlorotic persons of both sexes. The appetite, in these cases, is extremely capricious, being sometimes entirely wanting, and then voracious, but only for particular substances. The objects of desire, in this disease, are very various, as cinders, spiders, lice, flies, insects, toads, wood, hair, paper, earth, clay, chalk, vinegar, and even fæcal matters. Our medical records abound with cases of the following kind:—Dr. Elliotson met with a lady who fancied brown paper; "not paper hot-pressed and gilt-edged, but brown paper." Dr. Copland gives the case of a man who occasionally delighted to indulge himself in devouring a whole wine or ale glass, crumbling it between his teeth. A child, affected with epileptic fits, eagerly swallowed skeins of silk, reels of thread or cotton, needle-cases, buttons, or whatever came in his way that he could force down his throat; at length, nothing else being to be found, he ate the outer shell of the walnut, till his mouth and throat became painfully sore, swollen, and excoriated. In every mad-house there are young women fond of fæcal matter, who require to be watched every time they go to the water-closet. The longings of pregnant women are notorious. One longed for red-herrings, and actually ate 1400 of them between conception and parturition; another longed for a bite of a butcher's shoulder, and another for a bit of a priest's sleeve; but there is no end of these capricci.

Perhaps the most remarkable instance of pica is the irresistible propensity which the inhabitants of some countries of the torrid zone have to earth-eating. In Guinea the negroes eat a yellowish earth, called cavnac. Humboldt, on his return from the Rio Negro, fell in with a tribe of Ottomacs, who lived, during the rainy season, principally on a fat unctuous clay, each individual consuming from three-fourths to four-fifths of a pound daily; and in the dry season they usually ate a small portion as a relish. In Japan, cakes of reddish earth, called tanaampoo, are exposed for sale, and bought by the women to improve their beauty, slenderness of form being esteemed among the Japanese. In the West Indies, dirt-eaters, as they are termed, acquire a stronger attachment for a white clay, like tobacco-pipe clay, than either for spirits or tobacco. Their delight is to fill their mouths with it and allow it to dissolve; a practice which extends to negroes of all ages, for even children acquire it almost as soon as they leave the breast. Dr. Hunter states that a negro labouring under this malady is considered as irrecoverably lost for any very useful purpose, and that he seldom lives long. The treatment of this affection is attention to the general health, and the exercise of moral influence.

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* From pica, a pie; a bird said to be liable to this complaint.

Bulimia is a most inordinate appetite, entirely disproportioned to the wants of the body. The French have divided this form of disease into *faim de loup*, and into *faim canine*, the latter being distinguished from the former by the gorged stomach relieving itself after every meal by vomiting. Either form of this disease is extremely rare, and its causes unknown, but it generally occurs in the lowest class of persons. When Bonaparte was first consul, he sent to Corvisart a Russian soldier labouring under the *faim de loup*, and to whom it was equally indifferent what he ate, but he required every day forty pounds of meat and bread, or its equivalent, two bushels of potatoes. He daily drank, also, fluids to the amount of twenty-five pints. Leroux gives an account of a man named Bogén, the keeper of wild beasts in the Jardin du Roi, who had a similarly enormous appetite, and to whom it was equally indifferent what kind of animal he ate, whether it was fresh or putrid, killed in a state of health or had died of disease, raw or cooked. He is said to have eaten up a rhinoceros, an elephant, and several lions and tigers. He at length fell ill, and was brought to La Charité, where he not only ate up all that remained of the patients' food; but Leroux even saw him devour the poultices as they were taken off their sores. The patients who have died of this disease have been found to have singularly enlarged stomachs, hanging down like a pouch. They seldom live long or enjoy good health.

Several cases of the *faim canine* are given in the "Philosophical Transactions." One, a boy that lived at Blane Barnesley, in Yorkshire, and only twelve years old, who devoured 384 lb. of solid and liquid food in six days; but after every meal he vomited. In another similar case, 371 lbs. were eaten in the same short space of time, but he also vomited so that he was literally starved in the midst of his abundance.

Anorexia is the opposite extreme to bulimia, and is a loss of appetite, accompanied by most feeble powers of digestion. Anorexia occurs to a greater or less extent in almost every case of acute disease; and occasionally also it occurs as a primary disease, and to such a degree as to have acquired for the patient the reputation of the "fasting woman." Among the many instances of this class is the celebrated Anne Moore, the "fasting woman" of Tutbury. This person was fifty-one years of age, and gave out she had not tasted any solid food for five years, nor any liquid for nearly four years, and had no desire for either; that she never wetted her lips but when she washed her face, which happened only once a week; that she had voided no urine since Easter three years, and no fæces since that day five years. She professed also never to sleep so as to forget herself, nor to have lain down in bed for more than three years, although she admitted she sometimes dosed and reclined her head on a pillow. By this remarkable story she obtained great notoriety and much money, and was continuing to practise on the public credulity when it was determined to prove the truth of her assertions by setting a watch over her. The first watch was wanting in closeness of observation, and proved unsatisfactory, but enough had been seen to arouse suspicion. A second watch was therefore proposed, to which she assented most reluctantly. This second watch was superintended by three magistrates, four physicians, twenty-eight surgeons, and fifteen clergymen of the Church of England, who attached a Merlin's weighing-machine to the bed, and took every precaution to detect imposture. Up to the tenth day she did not take any nourishment, but the machine showed a loss of weight of many ounces. She now fell into syncope, from which she was recovered by administering some nutriment, when she confessed she could not exist without some food, as milk or tea, into which her daughter admitted she sometimes put sugar.

Abstinentia, or starvation, is the last degree of anorexia. Some persons fall into this state from cancer or stricture of the œsophagus; some from insanity, and a few others from the ordinary accidents of life. If the party be deprived altogether of fluids, he generally falls in three or four days, or at most within a week. A person, however, will live much longer deprived altogether of solids, provided he is able to obtain fluids.* The longest fast perhaps on record occurred in Dr. Willan's practice, who attended a religious monomaniac who had lived sixty-three days on a pint of water flavoured with a little orange-juice daily. From the histories of these cases it appears that the sensation of hunger ceases about the third day, and that when the fast is much prolonged beyond this period the party becomes querulous and subsequently outrageously mad. When Captain Franklin undertook his perilous journey to the North Pole, his party, during their extreme privations, were sensible of each other's pettishness and irritability, and wondered, if they lived to return to England, "whether they should recover their senses." When the Medusa, a French frigate, was wrecked off the coast of Africa, and the crew had betaken themselves to a raft, they fought battle after battle, throwing each other overboard, and all this without any object. Of the small number saved, one officer had so far lost his senses, that the night he was rescued he attempted to throw himself out of one of the ports of the vessel, to take a walk, as he said, in the green fields.

The pangs of hunger are, in the first instance, merely a neurosis of the nerves of the stomach; but it seems probable that after a time they become the exciting cause of a low inflammation; for we uniformly find, in cases of long inanition, whether from disease or accident, that the mucous membrane of the stomach is of a deep venous red or brown colour, and covered with a glairy mucus. It is this highly congested state which in all probability renders a minimum quantity of the lightest kind of diet, as a few occasional spoonfuls of milk or broth, alone proper in the first few days for the recovery of the famished patient. It is universally observed that any dereliction of this rule is generally fatal.

Polydipsia is an inordinate thirst—a disorder concomitant with many complaints, but which is also sometimes idiopathic. A small tradesman was admitted into the Hôtel Dieu with a sprain of the knee, when his uncommon thirst attracted attention. It was ascertained that he had been affected with polydipsia ever since he was five years old, and that from the time he was sixteen he had never drank less than two buckets a day. While he remained in the hospital he never drank less than thirty-three pints daily, often swallowing two quarts at a draught; his solid food was about one pound and three-quarters daily. This patient soon recovered from his accident, seemed in good health, possessed the strength of ordinary men of his age, and was the father of several children.

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* In M. Chossat's experiments, rabbits were found to live one-fifth longer when allowed water *ad libitum*.

Emesis, or vomiting, has many grades, or from nausea till nothing is retained on the stomach. It is often a consequence of most structural diseases of the alimentary canal, but it is likewise often purely functional. Young children sometimes suffer from it. Patients labouring under phthisis, or severe cough, or under structural disease of the liver or kidney, young women with an irritable uterus, and pregnant women, are more especially afflicted with emesis. Many hysterical women appear to vomit "par habitude." Pinel gives the case of a lady, aged thirty-seven, who, in consequence of some domestic chagrin, forsook the "grand monde," fell into a state of melancholy, and at length was seized with an obstinate and long-continued vomiting, of which she died. The stomach and intestines were perfectly healthy. The treatment of this form of disease is effervescing mixtures, mild cathartics, opiates, and mustard poultices.

Such is a short outline of the simple neuroses of the stomach, unaccompanied by any determined morbid secretion. The treatment of all these forms is extremely difficult, and resolves itself into attention to the general health, and to regulating the bowels by mineral waters, neutral salts, rhubarb, castor oil, opiates, and mild tonics.

The class of neurosis of the alimentary canal, accompanied by some morbid secretion, is composed of cholera vulgaris, cardialgia, pyrosis, and pneumatosis.

Cholera vulgaris is a severe gastralgia, accompanied by vomiting, and very often by purging, but not necessarily so. This disease is most common towards the close of summer and the beginning of autumn, but is by no means confined to that season. Its remote cause is probably, in many cases, some ephemeral atmospheric poison, and perhaps still more commonly a large quantity of autumnal fruit, or of early oysters. All ages are liable to it; infants, children, adults, and aged persons; but men are perhaps more liable to it than women. Many persons have died of it, and, on inspection, no trace of disease has been discovered in any portion of the alimentary canal, or other part of the body.

The symptoms are, that the patient, perhaps having dined or supped heartily, is awoke in the middle of the night with a severe pain in the stomach and bowels, which shortly afterwards is followed by vomiting and purging. In hot climates large quantities of bile are said to pass upwards and downwards, but in this country bile in any quantity is rare. Much more generally the matters vomited are merely the contents of the stomach, half digested, and extremely acid; while the stools, though sometimes dark, as in ordinary diarrhœa, are often white and colourless. This affection lasts from a few hours to a few days, is extremely exhausting, and if neglected has often proved fatal.

In prescribing for cholera vulgaris, we should look to the state of the tongue; and, if it be white and coated, the treatment is by an opiate, effervescing draughts, or mild purgatives. If, on the contrary, the tongue be clean and the bowels purged, the purgative may be omitted, and the treatment trusted to a mild opiate, as the syrup of poppies, or the pulvis cretæ compositus cum opio ℈j. to ʒſs. ex. aq. menthæ pip. 6^{tis} vel 4^{tis} horis. The diet should be slops and light puddings, and the drink perhaps weak brandy and water.

Cardialgia is the secretion of a fluid abnormally acid by the stomach, causing a most unpleasant sensation about the cardiac orifice, and hence termed *heart-burn*. This fluid is often regurgitated into the mouth, has a most disagreeable oily acid taste, and not only sets the teeth on edge, but, expectorated on any carbonated alkali, causes effervescence; and by Dr. Prout is supposed to be principally lactic acid. The effect of this state of the stomach is both present and remote. The present effects are more or less pain in the stomach, accompanied by distressing flatulence, derangement of the bowels, headache, terrifying dreams. The remote effects of this disease are, inducing palpitation, gravel or stone, or else a gouty or rheumatic state of the constitution, or *uric acid diathesis*, for the urine is loaded with the lithates, and the water small in quantity. This state of things, Dr. Prout seems to think, may be caused by an absorption of the acid, the assimilation in the lacteal system being most imperfect.

This disease most commonly occurs in those that live high, eat largely of rich black meats, and drink largely of malt liquors or champaigne, which act as ferments, turn acid, and dispose everything else to undergo the same changes. Some persons, especially those descended from gouty or rheumatic parents, have an idiopathic tendency to this disease, and in these the most opposite substances will produce it, as sub-acid fruits, salt meats, pastry—indeed anything that deranges their enfeebled powers of digestion. Tobacco has a poisonous principle which greatly favours the occurrence of this disease, and many persons suffer after smoking a very few cigars.

The treatment of cardialgia is by alkalies selected according to the state of the patient's bowels. If constipated, the sulphate of magnesia is perhaps the best remedy; on the contrary, if they be natural, the carbonate or bicarbonate of soda or potash is to be preferred: while, if relaxed, some mild opiate should be added to any of these medicines. Many practitioners prefer magnesia, but this is objectionable on account of its tendency to accumulate and concrete in the intestines. This disorder, once removed, is often prevented recurring by a dinner pill, as five grains of rhubarb, or as many grains of the pilulæ aloes comp., or other gentle purgative.

The dietetic treatment is of the utmost importance in these cases; and the quantity of wine or other fermented liquor, and also of animal diet, should be reduced till the disease subsides and the urine is healthy. Soups, tea and coffee, drank, as they usually are, boiling hot, debilitate the coats of the stomach, and tend consequently to produce this affection, and are abandoned by many persons from their so often exciting cardialgia.

Pyrosis (πυροω, to burn).—Water-brash, *fer chaud*, is a painful disorder of the stomach, occurring in paroxysms, and which does not cease till the patient vomits up a limpid colourless fluid like water, to the patient's taste cold and insipid, but which sometimes gives an acid and sometimes an alkaline re-action.

This disease is frequently met with in Scotland and in Ireland; and Linnæus says one-half of the inhabitants of Sweden are liable to it. From the large quantities of spirits drank in those countries, it has been supposed to be caused by their immoderate use. Dr.

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Elementary Principles of Medicine.

Pemberton, however, was convinced, after the minutest investigation, that this opinion was erroneous. "For had the disease arisen from the intemperate use of spirits, we should expect to find it most frequent among men, who are more addicted to immoderate drinking than women. On the contrary, I find," he adds, "that the disorder is more frequent among women than men, in the proportion of five to one. I must remark, moreover, to show how unfounded is the opinion respecting the use of spirituous liquors being the cause of the disease, that the women in the north of Ireland are remarkably temperate in their own country; and again, that the same order of women, when they are brought to this, and contract the pernicious habit of drinking spirits, are free from this complaint." This affection seldom occurs except in those who live upon a low and insufficient diet.

The fit of pyrosis usually comes on in the morning and forenoon, when the stomach is empty. The first symptom is a sense of constriction, as if the stomach was drawn towards the back, while others describe it as a severe and often a burning pain. This gastrodynia, as in fact it is, the patient finds increased by standing or sitting upright, and therefore he seeks relief by bending his body forward and making pressure on the affected part. The attack lasts from a few minutes to the greater part of an hour, when a clear, limpid, tasteless fluid is vomited up, varying in quantity from an ounce to a pint. As soon as this fluid is rejected the pain ceases, and the paroxysm is at an end. The paroxysm may occur three or four times a day, but when there is only one, it usually comes on before ten o'clock in the morning. In addition to the paroxysm, the patient's appetite is generally impaired; he complains of thirst, his bowels are generally constipated, and his person pale and emaciated.

The medical treatment of this affection is extremely simple, and consists in a drachm of the sulphate of magnesia, with fifteen minims of the tinct. hyoscyami three times a day. Many other medicines have been recommended, as the tinct. kino by Dr. Pemberton; but the simple remedy that has been mentioned is so uniformly successful as hardly to require any auxiliary or substitute. The diet should, if possible, consist of some animal food, and be otherwise nourishing.

Pneumatosis.—The stomach and intestines have the property of secreting gases, probably for the purpose of preventing that collapse of those hollow organs which perhaps would otherwise ensue. The gases found in the alimentary canal are oxygen, azote, proto-carburetted hydrogen, carburetted hydrogen, carbonic acid, and sulphuretted hydrogen. The two first are probably derived from the atmosphere, but all the rest are supposed to be secretions. All these gases, except the last, are found in the stomach, small intestines, and colon, but the sulphuretted hydrogen is found only in the colon, and then in extremely minute quantity.

The secretion of these gases is often a disease of much inconvenience, causing not only great distension, but also often much pain, forming *windy colic*, or pneumatosis. It always marks a feeble diathesis, and is a constant accompaniment of asthma and nervous affections of the heart, and also of every hysterical disease. It is one of the alarming symptoms also of typhus, when it causes tympanitis. If it exists idiopathically, it is best met with warm aromatic tinctures and purgatives, as the tinct. cardamomi, the tinct. aurantii, the decoctum aloës comp., rhubarb, and strong waters, as aq. cinnamomi, or the aq. menthæ piperitidis.

OF THE NEUROSES OF THE INTESTINAL CANAL.

The principle neuroses of the intestinal canal are enterodynia or colic, ileus, constipation, and diarrhœa.

Enterodynia, *Enteralgia*, *Colica*, or bowel colic, is a painful affection of the lower portions of the abdomen, caused by a violent contraction of the muscular fibre of some portion of the intestinal canal. The remote causes are indigestion, exposure to cold, or other general cause, and the parties liable are of all periods of life, or from infancy to old age. It also attacks either sex.

It is seldom that persons die of colic, but such instances have occurred, and dissection has often shown some portion of the intestines intussuscepted, affording a strong presumption that this affection depends on a spasmodic constriction of some part of the intestinal canal. This view of the case is supported by Mr. Blane, who states that in fatal cases of colic in horses, different portions of the alimentary canal are found strongly contracted, and much oftener of the small than of the large intestines, which also sometimes contain gas. The bladder also appears to participate in the spasm, the urine being either frequently ejected or else suppressed. Colic, therefore, is a spasmodic contraction of the intestines, the muscular fibre being either primarily or else secondarily affected in consequence of a morbid sensibility of the mucous membrane.

Colic is usually sudden in its attack, and the patient consequently, without any previous indisposition, is often unexpectedly seized with a severe fixed pain in some part of the abdomen, but which is relieved on pressure, so that the patient either sits doubled up or else rolls on the ground. In other cases, where much air is secreted, the bowels are greatly distended, and the pain is now compared to a twisting or wringing pain around the navel, accompanied with soreness. The walls of the abdomen also participate in the internal spasm, so that the navel is often drawn in towards the back, or the heads of the rectus exceedingly prominent, resembling so many round balls. The bowels are generally but not always constipated, and the stomach may or may not be irritable. In the latter case it often rejects both food and medicine. The pulse is little altered at the commencement of the attack; but if the paroxysm be prolonged, and the patient exhausted by pain, it may be hurried and frequent. The tongue is generally clean, although sometimes white and coated.

Diagnosis.—This disease is distinguished from inflammation by the pain being relieved on pressure, and by the quiet state of the pulse.

Prognosis is, in every case, favourable.

Treatment.—The treatment of colic is by opiates, stimulants, and purgative medicines. When the bowels are very constipated, five grains of calomel, fifteen grains of jalap, and one grain of opium should be administered immediately, and followed by mist. camphoræ c. magnesiæ sulphatis ʒj. c. tinct. hyoscyami ♏xv. to xx. c. tinct. cardamomi, ʒj. 4^{tis} vel 6^{tis} horis, until stools are obtained. In mild cases a scruple of rhubarb, or half an ounce of castor oil or other mild purgative, combined with a grain of opium, may be substituted for the opium, calomel, and jalap. Some practitioners have doubted the propriety of exhibiting opiates at the onset of the disease, but it is certain a mild purgative, combined with a mild narcotic, as the tinct hyoscyami, or syr. papaveris, will effect more than a drastic purgative without such combination.

As the disease is sometimes confined to the large intestine, enemata often give immediate relief. Externally, the application of large bags filled with hot chamomile flowers, or of heated sand, or of the stomach-warmer filled with hot water, are useful. The warm bath, fomentations, or a large linseed or mustard poultice over the abdomen, are also highly useful auxiliaries. Some patients are said, when these remedies have failed, to have been benefited by dashing cold water over the lower extremities; but the experiment is hazardous. The diet should, during the attack, be slops, as sago and arrow-root, with a portion of brandy; and for some time after the patient has recovered it should be light, and, perhaps, limited to fish and puddings.

Ileus, *Miserere Mei*, *Volvulus*, is a severe variety of colic, accompanied by vomiting, often so obstinate that the action of the bowel is inverted, and fæcal matter thrown up by the mouth. The patient may or may not be constipated. The returns for 1839 show 639 deaths from colic and ileus in England and Wales.

This inversion of the action of the intestine is often the result of inflammation, of cancer, or of other structural disease of the intestine; but it sometimes occurs idiopathically, and especially in broken and feeble constitutions.

Its more frequent cause, however, is some mechanical obstruction; and it is singular in how many different ways this may be produced. In some instances a portion of intestine has slipped into a loop, formed by a band of adhesion, which has united the folds of the intestine to each other, or to the walls of the abdomen, or to some other part. The colon also has been found to have taken a round turn on itself, or the right portion to have passed over to the left side, or left portion to the right side. Adhesions of the omentum, or of the appendix vermiformis, have likewise formed a similar loop or noose, and the intestine has been strangulated in it. Sometimes an accidental opening, acting as a noose, has existed in the omentum or mesentery. Ileus, from the intestine being strangulated in the various forms of hernia, is common. The accidental insertion of one portion of intestine into another, termed intussusceptio, is another cause. In one case, more than 18 inches of the ileum had passed into the caput coli; and in another, the small intestine protruded at the anus. In some few cases the intussuscepted portion has sloughed away, and yet the integrity of the canal has not been impaired. An ulcer of the colon has also communicated with the stomach, and in this manner ileus has been produced.

The following case, quoted from Dr. Abercrombie, will show that ileus is in many instances entirely functional:—A man, aged 40, had violent pain of the abdomen, urgent vomiting, and obstinate costiveness. The pain was at times increased on pressure, but not uniformly so; and his pulse beat at first about 96, but at length rose to 120. The attack had commenced with symptoms resembling cholera, which had speedily passed into those of ileus. After his death a large portion of the small intestines was found in a state of great and uniform distension, without any appearance of inflammation; and, except the lower part of the right lobe of the liver being unusually soft, no other morbid appearance could be discovered on the most careful examination.

It has been debated whether, in cases of stercoraceous vomiting, the fæcal matter proceeded from the small or large intestines. It is certain, however, that the contents of the small intestines take on the character and odour of fæces—a fact unknown to the older physiologists, and even to Mr. Abernethy. The matters vomited, therefore, for the most part proceed from the small intestines, and only occasionally from the large.

Ileus sometimes comes on in the course of a disease which at first presented no very formidable symptoms. As soon, however, as the stercoraceous vomiting is etsablished, the powers of the patient rapidly sink, and a few hours, two or three days, or at most a week, generally terminate his sufferings. In cases of ileus caused by a mechanical obstruction, pain, increased on pressure, and often of considerable intensity, is present, denoting that inflammation of the constricted part has taken place; and in this case the patient dies in redoubled agony, unless mortification takes place.

Diagnosis.—The stercoraceous vomiting distinguishes this from every other disease.

Prognosis.—The prognosis is not always hopeless, but is, nevertheless, most grave.

Treatment.—Such alleviation as this disease admits of is derived from opium, effervescing draughts, mild purgative medicines, opiated enemata, or mercury and opium by inunction. Popular opinion, which has termed this disease “ Lord have mercy upon us,” seems to consider it entirely beyond the powers of medicine. Instances, however, have been met with in which the patient has been recovered. Pinel, for example, mentions a case in which the matters vomited were supposed to be decoctum malvæ, which had been thrown up the rectum half an hour before, and yet the patient did well.

When ileus depends on a mechanical cause, the intestine sometimes rights itself; otherwise, neither art nor medicine afford relief.

Diarrhœa is a discharge of frequent loose watery motions; and there is hardly any agent, moral or physical, that acts on the human body, that is not capable of producing it. The passions, heat or cold, changes of weather, changes of wind, or any unusual indulgence at table. Many known morbid poisons, and probably many ephemeral ones, not yet determined, are also its frequent cause; and so general is this disorder, that every age is liable to it, as likewise either sex, and, perhaps, in nearly equal proportions.

Many opportunities present themselves of examining patients who have died of diarrhœa; but often not the slightest appearance of inflammation or other structural disease in any part of the alimentary canal can be found. It is consequently in a great number of cases a disease purely functional.

Some speculations have been entertained as to the seat of diarrhœa, or whether it results from a diseased action of the small or the large intestine. From the quantity of fluid occasionally found in the small intestine, there is no question of that portion of the alimentary canal being often the seat of diarrhœa. In other cases the colon is, perhaps, in like manner exclusively affected; but probably it is more common that both portions are simultaneously affected.

In diarrhœa the fæcal discharge often deviates from health, not only in consistency, but also in colour, being sometimes white or clay-coloured, or else green or black; and the question arises whether this discoloration is owing to a diseased state of the bile, or to the morbid secretions of the intestinal canal; and it may be affirmed to be more often owing to the latter than to the former.

In diarrhœa the bile is, perhaps, often faulty; but on examining the bodies of those who have died of this complaint, we often find the bile in the gall-bladder healthy, and also the matters contained in the duodenum healthily coloured with bile; but in the lower portions of the intestines one portion of the fæcal matter may be white, another green, and, perhaps, another natural; the colouring matter of the bile having been discharged or otherwise acted upon by the secretions of the intestine; and sometimes the fæcal matter is of a healthy yellow colour in the small intestines, and green or white throughout the whole extent of the large.

Symptoms.—In diarrhœa the stools are frequent and watery, and sometimes mixed with blood; often accompanied by flatulence, and by pain more severe immediately before passing a dejection. Their number is very various, or from three or four to thirty or more in the course of the twenty-four hours. They are generally copious; and Morgagni states, that in his own case he once passed 16 lbs. in a very few hours. The duration of the disease varies from a few hours to many months.

For practical purposes idiopathic diarrhœa is divided into two kinds, or into that in which the *tongue is clean*, the pulse quiet, and all constitutional re-action absent; and again into that in which the *tongue is white* and coated, the pulse accelerated, some fever present, and the pain or soreness constant, and increased by pressure. The stools in either case may be black, green, white, or mixed with blood indifferently.

Treatment.—When the *tongue is clean*, if the disease be quite incipient, the most usual practice is to give one dose, consisting of an opiate, combined with a gentle cathartic, as opii gr. j., c. pulv. rhei ℈ j., to remove any offending matter that may be present. These medicines having produced their intended effect, we may now exhibit medicines more distinctly astringent. In many cases a drachm of syrup of poppies after each stool is sufficient. In severe forms of the disease, aqua menthæ piperitidis ℥ ſs. c. pulv. cretæ comp. c. opio ℈ j. to ʒ ſs. every four or six hours, is an excellent prescription; and these medicines may be used whether blood be or be not in the stools. If the opiate and aromatics contained in the above medicine should prove insufficient, it may be necessary to add to each dose some of the class of pure astringents, as a drachm of the tinct. kino, or catechu, or hæmatoxyli.

There are cases of diarrhœa with a *clean tongue*, which will not yield to opiates, astringents, or stimulants, either singly or combined, and which probably depend on a want of tone in the intestine; and in these cases five grains of salicine every four or six hours have often stopped a diarrhœa that appeared fast hurrying the patient to his grave.

When diarrhœa is accompanied by a *white furred tongue*, together with pain and soreness, it is necessary to exhibit opiates, combined with some mild purgative. Thus aqua menthæ c. magnesiæ sulphatis ʒ ſs. to ʒ j., with a drachm of syrup of poppies; or 15 minims of the tinct. hyoscyami; or, in severe cases, with iij. to v. minims of tinct. opii 4^{tis} vel 6^{tis} horis, are remedies on which, as a general principle, we may very confidently rely. In other cases rhubarb, castor oil, or any other mild purgative, may be substituted for the Epsom salts. In cases of diarrhœa, accompanied by vomiting, a drachm of syrup of poppies, *neat*, repeated every half hour or every hour for two or three times, often quiets the stomach, and enables it to bear the other remedies; or soda water, or the effervescing draught, with a table spoonful of brandy, with or without a few minims of tinct. opii, often remain when everything else is rejected.

Most practitioners lay great stress on the colour of the stools, and the necessity of correcting the supposed morbid states of the liver; but it has been shown that the various colours of the stools are caused rather by morbid secretions from the surface of the mucous membrane of the intestines, than by any defective state of the bile in the gall-bladder; and the conclusion from this consideration is, that in simple diarrhœa mercury in any form is either unnecessary or injurious in the great majority of cases. In a smaller number, however, it is sometimes necessary, and more especially in children under four years of age. One general law may be said to be established in the cure of diarrhœa, which is, that in the adult, whatever be the form of the diarrhœa, if the stools be dark at first, and then become light coloured, purgative medicines are no longer beneficial.

The dietetic treatment should be limited to slops, puddings, and white fish, and the drink to weak brandy and water, which acts locally as an astringent, and generally as a diffusible stimulus.

Constipatio is a retention of the stools beyond the usual period, so that when they are passed it is with difficulty, and comparatively in a hard indurated state.

Remote Causes.—The remote causes of this affection are extremely numerous. Every form of indigestion, for instance, may be a cause of constipation. Hæmorrhoids, or piles, is another frequent cause; as well as a too sedentary life, especially if too strictly applied to study. Also women labouring under amenorrhœa, or other functional disease of the uterus, have often constipated bowels; and almost every acute disease is occasionally ushered in by constipation. It is likewise a common concomitant of most chronic affections, as dropsy, diabetes, hydrocephalus, pyrosis, rheumatism, or mania. Many articles of diet are causes of constipation, as brandy; many mechanical accidents, also, as stricture of the alimentary canal; many medicinal substances, as lead, opium, or other astringent, are all causes productive of constipation.

Predisposing Causes.—Persons of all ages are liable to this affection; but it is most common, perhaps, after the middle periods of life. Both sexes suffer from it; but women, from their more sedentary lives, the greater capacity of their colon, and their greater delicacy on these subjects, are most disposed to it. When pregnant, it is a frequent complaint with them, as some suppose, from the pressure of the enlarged uterus on the colon.

Pathology.—This disease is essentially a disease of function, and often exists without the slightest trace of organic lesion. Its physiological cause appears to consist in want of sensibility of the nerves of the mucous membrane of the alimentary canal to the stimulus of their ordinary fæcal contents, so that the peristaltic motion downwards is retarded. It has been a question in what portion of the alimentary canal constipation takes place; and most authors have placed its seat exclusively in the large intestines. In posthumous examinations however, formed, lumpy, hardened fæcal matter is sometimes found in the small intestines; and hence it is manifest that the seat of constipation may be either the small or the large intestines, and, perhaps, most frequently in both.

Symptoms.—It is a law of the animal œconomy that most persons in health have one evacuation daily, and at the time when the organic sensibility is heightened by repose, as on getting up in the morning; or when it is excited by a meal, as after breakfast. If this period be prolonged the fæces become hard, knotty, or scybalous, and ultimately form large round balls. This retention of the fæcal matter often causes great distension of the abdomen, as well as pain, irritation, and a flow of blood from the rectum on the passing a stool. In some instances the fæcal matter, whether retained in the caput coli or other part of the intestinal canal, causes so much irritation that constipation and diarrhœa co-exist at the same time, the solid matters being retained, while the more fluid portions give rise to repeated stools. A complication often confirmed by the evidence of repeated examinations after death. Such are the local symptoms.

The general symptoms are not less distressing than the local affections. The appetite is in general lost, the head aches, a gloom is cast over the spirits, the mind and body are indisposed to exertion, the temper is soured, and every pleasure of life embittered. The effects of constipation are so well known, that in some courts it is said to have been a rule never to ask a favour till after the monarch's bowels had been freely opened. Besides this general influence of constipated bowels over the healthy state of every function, there are few disorders which are not aggravated by its continuance, and few that are not benefited by its removal, while many are cured altogether. There is, indeed, no rule of health more important than that the bowels be kept regularly and daily open.

Instances of constipation of two, three, four, five, to, perhaps, fifteen days are not rare. A gentleman under the care of Mr. Benjamin Phillips passed thirty-seven days without any evacuation. In a case related by Dr. Willan, of a monomaniac who destroyed himself by a voluntary religious fast, the patient had a stool on the second day of this course, but not again till the fortieth day. An instance occurred to Dr. Williams, St. Thomas's Hospital, and related by Dr. Burne, in which the patient, a lady, had only four stools in a year; while a young lady, aged 18, was attended by Dr. Burne, who passed neither flatus nor fæces for six months.

The quantity of fæculent matter discharged in a state of health is about five ounces; but in cases of constipation the quantity passed at one motion is often quite extraordinary. One case is related by Dr. Warner in which the party, a lady, passed in a short time forty-two lumps, each as big as a hen's egg. In the case of Dr. Williams, the quantity passed at each motion filled a common-sized pail, and consisted of a number of lumps of healthy fæces, each as big as the head of a full-grown fœtus. Indeed, the passage of each lump gave as much pain as if the party had actually brought a child into the world. In some instances the fæcal matter retained collects in the caput coli, and forms a tumor so considerable that it has been mistaken for fungus hæmatodes, or an aneurism.

Treatment.—When the constipation is accidental and of short duration, any of the milder cathartics, as the sulphates of soda or of magnesia, castor oil, rhubarb, aloes, or the confectio sennæ, or the pilulæ colocynthidis comp., will in general remove it. If, however, the constipation is habitual, these laxatives should be continued daily for a short period till the *healthy habit* of a daily evacuation be established.

The remedies that have been mentioned, though often successful, yet occasionally fail from the low tone of the sensibility of the mucous membrane of the intestine. In these cases the combination of a tonic with a purgative will often produce a more efficient action than the purgative alone. Thus we often find two grains of the ferri sulphatis, or an ounce and a half of infusi gentianæ, combined with a drachm of the sulphate of magnesia, and exhibited, according to the urgency of the case, three times a-day, or every six hours, will often produce catharsis when the salt alone would fail. In old persons, also, we find that a combination of aromatics with the purgative, as in the decoctum aloës, is a more useful and effective remedy than the same or even a greater quantity of aloes exhibited alone.

When constipation does not yield to the simple treatment which has been mentioned, recourse must be had to larger doses, or else to more active purgatives. Thus calomel, gr. v., c. jalapæ, gr. xv., is a dose which rarely fails even in our public hospitals to produce motions, and this, if necessary, may be followed up four hours after either by the neutral salts in divided doses, or else by a black draught in one dose. If a stronger medicine than the above be necessary, elaterium is of greater power, and one or two grains will sometimes produce hypercatharsis. Elaterium, however, often produces vomiting; and in these cases a drop or two of croton oil is a remedy which may be substituted with success, as it sits easily on the stomach. The catalogue of purgative medicines, however, is large; and when the more powerful medicines are necessary, recourse should at once be had to medical advice.

If medicines by the mouth have been insufficient, it is desirable to hasten their action by enemata. The enemata may be simply a pint of warm water, 100° Fahrenheit; or the same quantity of warm water, with half an ounce of common salt. The common soap enema is likewise a valuable remedy; and when the constipation is great, half a pint to a pint of castor oil, *neat*, may be thrown up.

Sometimes the fæcal matter accumulated in the colon is so large in quantity, and so hard and impacted, that manual assistance is necessary to relieve the patient. "Mrs. W. had suffered for years from constipated bowels; but when I saw her," says Mr. Jukes, "a contrary state of bowels had taken place, she being much harassed by purging, which had existed more or less for many months. At length violent tenesmus came on, with a bearing down most intolerable, much worse, she said, than she had ever suffered in any of her confinements. I examined the rectum, and found a mass of hard matter which I could not break to pieces without the aid of an instrument." The mass consisted of a variety of undigested substances, which, when broken down, were washed away by injections, to the perfect relief of the patient.

Dietetic Treatment.—The patient suffering from constipation should avoid port wine or brandy, and should eat freely of sub-acid fruits. The advice of Mr. Locke should also be strictly followed, or that he should go daily at the same hour to stool; for such is the periodical regularity of all the functions of the body, that they are more regularly performed at accustomed hours than at any other time.

Having thus described the diseases of the alimentary canal arising from general causes, it is now necessary to apply ourselves to those arising from specific causes, or from entero-lithates, from worms, from the too abundant use of salt provisions, causing scurvy; also to those caused by the effects of lead, of alcohol, and of fish poisoning.

Of Entero-lithates.

Entero-lithates.—This term has been given to the great variety of organic and of inorganic substances which, having been swallowed, are sometimes found either in the stomach or intestines. The organic substances are principally the husk of the oat-cake formed into balls, and which are occasionally met with in the stomach; and also plum or cherry stones. In a youth who died of colic and convulsions, the cœcum was found stuffed with a large number of cherry-stones. In another patient, who died after three years' suffering, the colon was found distended with about three pounds of cherry-stones and about forty lead balls, which he had swallowed in the hope of obtaining ease. When it was the fashion to take mustard-seed as a medicine, these were often passed in large quantities. One gentleman sowed some of them, and they throve well. Dr. Prout saw a lady of title who passed what appeared to be larks' hones.

The inorganic substances are as various as those of the organic kingdom. The eating of pounded glass is not uncommon; and, if broken into small pieces, Chalissièr considered it as perfectly inert, and even large pieces swallowed are often productive of little other inconvenience than a scratch of the throat. Sauvages made dogs swallow bits of glass of various sizes, and with such impunity that he ended his experiments by swallowing some himself, and without any notable accident. Portal saved a young man who experienced alarming symptoms after swallowing fragments of glass broken between his teeth, by first making him eat large quantities of boiled cabbage, and then giving him a vomit.

To swallow pins is a common mode, in some countries, of committing suicide, and the usual mode of getting them down is by enveloping them in wax. Sometimes, also, they are given with an intention of destroying others. In April, 1838, a healthy child of two months and a-half old was seized with a paroxysm of suffocation, and its life appeared to be in danger. The mother, however, on examining what had passed from this child's bowels, found in the first stool three pins, in the second four, and in the last two pins. This child was nursed by a servant girl of weak intellect, who admitted that she had given them to the child in one of those paroxysms of irritation which accompanied her menstrual period.

Pins thus swallowed are sometimes found, as in the above case, in the bowels; in others in the stomach; and sometimes in various other parts of the body. Olivier examined a stone patient, that died after the operation, and found a bent pin making its way through a fold of the mucous membrane of the stomach, which had caused no other alteration than a slight thickening of the part where the pin was lodged. More commonly, perhaps, they make their way either to the surface or to some other part of the body. Dr. Silvy gives a case in which 1400 pins or needles were found implanted in the different muscles or organs of the body in a maniacal girl who died of phthisis. None, however, were found in the lungs. Boisseux has given a similar case of a young woman who, during a delirium of twelve days, swallowed 800 pins, all of which were extracted from the superficies of the body.

But the swallowing of pins is not always free from danger. Arnaud and Saviard found a large pin in the testes, and which had caused carcinoma of that organ. Schenk saw a case which was fatal from a pin having penetrated the liver; and Bayle another, in which a pin had penetrated the ureter, and caused an abscess in that part.

Besides pins, watches, knives, penny pieces, and half-crowns have been swallowed and retained by mountebanks, or polyphagists, as they are termed. One of these swallowed a silver fork, which, being retained, was removed by an incision. Perhaps among the most remarkable of these entero-lithates is an egg-cup found in the ileum of a man by Mr. Deads. The man was sixty years of age, and for several months had suffered from abdominal ailments. He at length died after stercoraceous vomiting, singultus, and great distension of the abdomen. On examining him, an earthenware egg-cup was discovered impacted in the ileum, about ten inches above the cœcum. The ileum at this part adhered to a hernial sac, and prevented its further passage downwards. Another person swallowed a piece of a flute four inches long; but was more fortunate, for it passed by stool three days afterwards.

Sometimes the intestinal entero-lithates are introduced per anum. Dr. Burne relates the case of a lady who, being supposed to labour under a stricture of the rectum, was directed to use a bougie at her own discretion. Being from home, however, and without a bougie, she substituted at bed-time a piece of wax candle, about six inches long, and which, in the course of the night, slipped into the colon. Within a week she was seized with vomiting and bearing down, so severe, that it led to an examination of the rectum, when, in a mass of fæcal matter, and by no means hard, the candle was found broken in the middle, but held together by the wick.

The largest number of entero-lithates, however, has arisen from the concretion of substances taken as medicine. Mr. E. Brande gives the case of a lady who took a tea-spoonful of Henry's magnesia every night, till it was calculated the whole quantity taken amounted to between nine and ten pounds troy. At length her left side became tender; an obscure tumor could be felt: and after much suffering she passed a large quantity of what appeared to be sand. This was thrown away; but the following day she passed another quantity, which, being measured, amounted to two pounds; and subsequently several soft lumps were passed, which, being analyzed, were found to be the sub-carbonate of magnesia, concreted by the mucus of the bowels, in the proportion of about 40 per cent. In another case, in which no magnesia had been taken for six months, yet from four to six pounds were found embedded in the head of the colon. In a case that proved fatal in St. Thomas's Hospital two large lumps of concreted magnesia, each as big as walnuts, were found in the small intestines. Chalk and sulphur have been found concreted in the same manner.

Worms—Entozoa-Intestinalia (εντος ζωον).

Besides dead or inanimate substances, living animals are also occasionally found in the intestinal canal.

The intestinal entozoa are four in number, or the *Tricocephalus dispar*, or long thread-worm, and the *Ascaris vermicularis*, or common thread-worm, or maw-worm, both or which inhabit the large intestine. Again, the *Ascaris lumbricoides*, or round worm, and the *Tænia*, or tape-worm; and these two last inhabit the small intestines. These worms were known to the ancients, with the exception of the tricocephalus dispar, which Bremser considers first to have been discovered by Morgagni. It does not, indeed, appear to have been generally known till the year 1760, when it was accidentally observed in the cœcum of a child, five years old, by a student at Göttingen, who showed it to Ræderer and Wagler, who traced it afterwards in a considerable number of French soldiers who were stationed in that city, and died of epidemic fever. It appears to be common in Germany, much less so in France, and still more rarely in this country.

The *Tricocephalus dispar* inhabits the large intestines, and principally the cœcum, and is from one inch and a-half to two inches long. Its body is capillary for about two-thirds to four-fifths of its length. This capillary portion terminates in a minute point, which is its head. The male is smaller than the female, and is known by the posterior or thicker portion of the body being spiral, whilst it is straight in the female. The ova are elliptical.

Oxyuris vermicularis, *ascarides*, from *ασκαριζειν*, to leap, or *maw-worm*, has two sexes; the male, according to Bremser, being from a line to a line and a-half long; while the female is from four to five lines long. Their heads are obtuse, vesicular, and traversed by a tube which is the alimentary canal. These worms augment in size from the head to the termination of the anterior third of the body; and from that point they decrease till they terminate in a point scarcely perceptible even by the aid of a microscope. The tail is spiral in the male, and straight in the female.

Bremser and Rudolphi are satisfied that these animals are oviparous. Their abode is in the large intestines, and especially in the rectum, where they often occur in large numbers, to the amount of many thousands. They take their popular name (ascarides) from their head being in perpetual motion, and from their great general activity; so much so that they sometimes find their way into the vagina, when they cause intolerable itching. Frank has also found them in the urethra. They are most common in childhood, but no age is exempted. Cruveilhier was consulted by a man, upwards of fifty, horribly tormented with them; and Bremser by an old man, upwards of eighty, and who continued to pass them till his death.

The *ascaris lumbricoides*, or *round-worm*, is from two to three lines in diameter, from six to fifteen inches in length, is attenuated at both extremities, is generally of a reddish brown colour, and has a small sulcus or groove on each side, which extends the whole length of the body. The head is distinguished by being rather smaller than the tail, and by being surmounted by three valves, which, being opened, bring into view a small tube, which is the mouth. The two sexes are separate, and the male is known by the greater tapering of the tail, which is incurvated, and by the male organ having a double spiculum. The oviducts of the female can readily be seen through its transparent membranes, and appear to fill nearly the whole body. This worm is also oviparous.

This worm inhabits the small intestines, although it is sometimes found passing upwards to the mouth and downwards to the rectum. They have consequently been known to make their way into the œsophagus, and to creep into the nares, and even into the larynx, trachea, and bronchi. The biliary ducts of the liver have been seen full of them; they are said also to have been found in the gall-bladder and pancreatic ducts; and Laënnec states he once saw not only a great number of ascarides in the stomach of a child, but also in the pori biliarii, which was full of them, while the liver looked as if it had been gnawed by them. They have also been known, in passing downwards, to get into the appendix cæci, also to escape through ulcerated openings into the cavity of the abdomen, or into the bladder and vagina; and, by means of an external fistulous opening, through the walls of the abdomen.

The number of ascarides found in any individual in this country seldom exceeds one, two, or three; but Dall' Olio tells us he threw up, in the course of a fortnight, 450 of them. Marteau de Grandvilliers knew a soldier who passed 367 in six days; and Dr. Hooper speaks of a girl, only eight years old, who voided upwards of 200 in a week. Frank knew of a case where eighty of them, rolled up as a ball, were expelled *en masse*, and alludes to another where the intestines, both great and small, were stuffed with them.

The *tænia*, or *tape-worm*, has a head so extremely small that it is hardly visible to the naked eye, and possesses a power of contraction so great that it sometimes appears long and narrow, and sometimes broad and short. This head has also four suckers (*souçoirs*), which are sometimes prominent and sometimes retracted; and, when the head is elongated, we see between the four suckers a protuberance or disc, on which is sometimes observed a double row of little crochets; but, as they are not always present, Bremser thinks this crown of crochets is lost by age.

The neck of the tænia is flat, of variable length, and without articulations. This unarticulated neck is joined to an articulated body, of which the first joints are narrow, and always broader than long. Towards the more central parts of the animal they are square; and after this they form oblong parallelograms, whose length greatly surpasses their breadth.

On the edges of the articulations, in some individuals at least, are seen two white lines, placed one over the other, and which extend along the whole body of the animal. These lines Rudolphi considers to be the alimentary canal, and to derive their origin from the suckers in the head. At each corner, also, of the best-developed articulations are sometimes seen small papilliform protuberances, each having a very visible foramen in the centre. These foramina were formerly supposed to be so many mouths, but modern naturalists consider them as so many oviducts. The male organs of the tænia have not yet been discovered.

The breadth of this worm varies much. The head is frequently not more than one-half to one-third of a line in breadth; but it gradually augments till its breadth equals three, four, and even six lines.. The thickness of the tænia also varies much; some are thin and almost transparent, while others are thicker and more fleshy.

"Nobody," says Bremser, "has, I believe, seen an entire tænia, or one at once provided with a head and a tail, for it constantly happens that the last articulations, which are usually loaded with fœcundated eggs, are detached, and evacuated by stool, before those nearest the head are completely developed; and for this reason we cannot correctly determine the length this worm attains, nor the number of articulations of which it is composed. The length of the tænia, however, is very great; and tæniæ of twenty-four feet long are not uncommon. Robin found, in the dead body of a man who had recently passed a portion of it many feet long, a tænia which he estimated at thirty feet. The early writers make mention of tænia of much greater length; as Reinlein, one of between forty and fifty aunes. Pliny mentions one of 300 cubits; and, in the Dissertations of Copenhagen, one is related as having been 800 aunes long; and, if this be true, supposing the aune to be only twelve inches long, the worm must have been coiled up twenty times, from one end of the intestine to the other, forming a mass which would destroy all peristaltic motion.

Naturalists possess no satisfactory information of the reproduction of tænia. The articulations being similar to each other has induced many persons to consider them as so many distinct animals, generated one after the other, and connected together; but this opinion is no longer entertained. Blumenbach and Bremser affirm that the worm is a complete animal at birth; the articulations of the tail being first developed, and even detached, before the anterior articulations are yet visible, or only form a kind of elongated neck. The age which the worm attains, as well as the time necessary for its perfect development, are not yet determined.

"The motions of the tape-worm, whether whole or after division, are often," says Rudolphi, "most active; and people in whom it exists are sometimes conscious of its undulatory and disagreeable movements; and portions of many feet are said to have been protruded and afterwards drawn up by the mere effort of the animal. The habitat of this animal is the small intestine. There are said to be many different species of it.

Remote Cause.—As these intestinal entozoa differ from any known earth-worm, they are considered to belong to the class of parasitic animals. As all of them exist either in fish, in the ox, in the sheep, and in the animals generally which we use for our diet, it seems possible that the ova may be introduced with our food, the incubation being only perfected in those persons whose morbid state of the intestine affords them a fit nidus, or a large quantity of mucus.

Predisposing Causes.—Worms of every description are more common in childhood than in adult age; and in the leucophlegmatic child of weak digestion, than in the strong and healthy. The same temperament also favours their development in the adult. As a general rule, they are common in proportion to the quantity of vegetable food on which the party lives, that diet favouring the secretion of mucus, which is the nidus of these animals. From this circumstance, perhaps, they are more common in France than in this country; in Egypt than in France; while in the East Indies, where the Hindoo lives on rice, nine persons out of ten are infested with these animals.

Pathology.—The portion of intestine inhabited by the worm is sometimes a little redder than usual, and sometimes paler, and is generally loaded with mucus, in which these animals delight to live. It has been supposed that the worm possesses the power of perforating the intestine, or even the substance of the liver; but they have no organ fitting for this purpose, and appear incapable of injuring the intestine otherwise than by their perpetual motion.

Symptoms.—The existence of worms in *the colon* (as the ascarides) seldom gives rise to much inconvenience until they are sufficiently numerous to pass with the stools. About that time the patient is troubled with much irritation of the rectum, with itching, and often bleeding from the nose, with headache. His bowels also are either constipated or relaxed, the stools exceedingly dark or white, his appetite sometimes lost and sometimes voracious, his sleep disturbed, and his temper fretful; and often, as a result of so many combined irritating causes, remittent fever.

The symptoms of the existence of worms in the *small intestine*, as the tænia and lumbricoides, are often exceedingly obscure, and simulate many other diseases; so that, until a patient has passed a worm or a portion of a worm, we are unable, with any certainty, to predicate its existence; and at no time till we actually see the worm can we determine its species.

The general symptoms of worms of the small intestines are occasional colic, a variable state of bowels, capricious appetite, and headache. The mind is also often so much depressed as to amount to hypochondriasis. Thus, Krause gives the case of a young man who, when troubled with worms, was always seized with uncontrollable fits of laughter; and Giraud an instance of a young man who, under similar circumstances, felt an entire impossibility of walking over anything whatever, even so slight a substance as a piece of white paper; or, if he attempted to do so, he fainted. Hufeland mentions a case in which the patient, without being jaundiced, saw everything yellow; Delisle another that could not bear the sound of a musical instrument. And cases in which St. Vitus's dance, epilepsy, and convulsions have been the prominent symptoms, are by no means infrequent.

When lumbricoides and tænia pass from the small into the larger intestines they are speedily evacuated, and the symptoms are alleviated. When, however, a lumbricoides passes upwards, the symptoms are more marked. In general, the worm is little troublesome till it reaches the upper part of the pharynx, when, either by irritating or getting into the glottis, it often gives rise to a most fearful sense of suffocation. It commonly, however, continues its upward progress till at length it makes its exit, by the assistance of the patient's finger, either through the mouth or nose.

Treatment.—The habitat of the ascarides being for the most part a collection of mucus, the means used for their expulsion is generally some sharp purgative medicine, as two grains of calomel and ten grains of jalap, or as many of scammony, exhibited two or three times a-week. It ought, perhaps, in no instance to be given oftener, for if the purging be continued the intestine is weakened and more mucus secreted, so that the predisposition to harbour them is increased. In weakly children, small doses of Epsom salts will ultimately effect the same object, and with less distress to the patient. Many persons place great confidence in calomel, as a medicine capable of destroying them, but it does not appear to act beneficially except as a purgative, and consequently it is an auxiliary, and not by any means the most valuable part of the treatment.

From the ascarides being situated so near the rectum, enemata have at all times been much used in these cases; and injections of oil have been much commended, and especially of castor oil. But these animals, having no respiratory organs, will live from thirty-six to forty-eight hours in castor oil; from the same cause, tobacco glysters have failed. Indeed, very little benefit has been derived from any local treatment. Warm-water injections tranquillize the intestine, and

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perhaps give more relief than anything else. The ascarides are killed by cold; but it is hardly safe to throw a cold injection into the colon of a child.

For the ejection of tænia or the lumbricoides from the small intestines, a great many remedies have been recommended; but, in the present day, practitioners very generally limit themselves to one or two methods, or to a sharp purgative. The celebrated Swiss remedy, purchased by the King of France, was a sharp purgative, and proved to be twelve grains of calomel and twelve grains of scammony, followed shortly after by ℥ſs. to ℥j. of the sulphate of magnesia. It is questionable, however, whether calomel is an essential part of the treatment, for Rossenstein administered it many times, so as to produce salivation, without expelling a single worm; and Brera adds that, in the mines of Lydria, and in the laboratory of Chemnitz, in Hungary, and at Freyberg, in Saxony, where they use much mercury in purifying gold and silver, he has seen worms endemic among the workmen.

In the London hospitals the purgative treatment is seldom adopted, it being more usual to exhibit the oleum terebinthinæ neat. Half an ounce of this medicine makes the patient slightly tipsy, and produces three or four motions; and in these the worm is usually found, the animal having, it is supposed, a great antipathy to this substance, lets go its hold and actively attempts to escape. This medicine may be repeated twice a-week. Three-fourths of the inhabitants of Cairo are said to be infested with tænia, and their remedy is twenty to thirty drops of petroleum; a remedy not greatly dissimilar. The Grenadine bark has acquired much reputation in this disease in the West Indies, but it has not supported the hopes that have been entertained of it, at least in this country.

The situation of these worms render enemeta of little value, but cold quickly destroys them. They seem to rejoice in heat, for Coulet boiled a tænia in veal broth for twelve hours, and it was as lively at the conclusion of the experiment as at the commencement.

The diet in these cases should be nourishing, and intermixed with a considerable portion of animal food.

Scurvy—Scorbutus.—The muriate of soda, when largely eaten in combination with animal matters, acts as a poison, and, like most other poisons, produces in the first instance an extreme depression of the vital powers, which is followed by a general tendency to hæmorrhage from the gums, also into the sub-cutaneous cellular tissue, and from the mucous membrane of the nose, intestines, and of the lungs.

Scurvy is mentioned by Pliny as having occurred in the Roman army commanded by Germanicus. It prevailed also, to a frightful extent, in the army of St. Louis, when he was made prisoner in Egypt. But it was not till navigation was improved, and long voyages undertaken, that this disease became well known from its general prevalence and formidable character. Vasco de Gama, in his first voyage to the East Indies by the Cape of Good Hope, in 1497, lost 100 men out of 160 by this affection. James Cartier, in his second voyage to Newfoundland, in 1535, speaks of suffering still more severely, as, of 110 people, there were not ten whole; and it is plain he considered it to be contagious. The scurvy continued to prevail, with little abatement, till 1794, when an improved state of society, and a better diet introduced into the navy, have so reduced it that, in the year 1839, only 101 cases are reported to have died of scurvy in England and Wales.

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Remote Cause.—The remote cause of scurvy is, unquestionably, the too abundant use of salt provisions; and the whole history of the disease is a proof of this fact. In the middle ages, as they are termed, scurvy prevailed epidemically among the inhabitants of the low countries of Holland, Friesland, Brabant, Pomerania, Lower Saxony, and, indeed, in all countries from the 50° to the 60° of north latitude. This was caused by the absolute want of winter food for the cattle, so that it was necessary to kill them on the setting in of the frost, and either to salt or dry the flesh. Hence the large stores of salt provisions found in the larder of the elder Spencer, in the days of Edward II., even so late in the spring as the 3rd of May, or 600 bacons, 80 carcases of beef, and 600 muttons. In all these countries, however, in proportion as agriculture has advanced, and a succession of green crops enabled the farmer to kill his best and fattest meats in winter, and in proportion, also, as vegetables have been introduced at our tables, together with a liberal use of wine, so has this disease disappeared. The former universal prevalence of scurvy, also, in the navy, and its almost entire disappearance in the present day, necessarily has reference to a particular cause, or the too abundant use of salt provisions. "In 1797 the victualling of the navy was changed, greatly improved, and strictly regulated; and, immediately consequent to the change, the health of the seamen improved strikingly. Scurvy, typhoid fever, dysentery, and putrid ulcer, which, up to the period of the change, produced great havoc, became comparatively rare in occurrence and light in impression." "Since 1797 the improvements have been, giving cocoa instead of gruel (burgo) for breakfast, issuing salt meats at a much earlier period after being cured, the supply of better articles and in greater abundance by one-third, and also the substitution of tea in the afternoon instead of spirits; and, with every improvement in these respects, there has been, as a general result, a further improvement in health, till the four forms of disease, at no distant date so destructive, are scarcely known except by name."

It seems probable, however, that there may be other causes, which, combined with peculiarity of idiosyncrasy, are capable of producing the disease, for a few cases (and the number is but small) apply to the hospitals with what has been termed the land scurvy; the patients, according to their own account, not having eaten either salted, cured, or smoked meats; a form of disease which appears to have broken out among our troops a few months ago, at the Cape of Good Hope, while defending the back country from the Caffres.

Predisposing Causes.—Scurvy is seldom seen except in male adults, between the ages of fifteen and forty, that class of persons being most exposed to the remote cause. It seldom, however, occurs in women, for they are rarely placed under the necessity of living on salted provisions; but when they habitually indulge in what is usually termed "a relish," they often suffer from it. The other predisposing circumstances are insufficient nutriment, severe disease, anxiety, and wet or damp. The effects of anxiety of mind, in producing the disease, greatly struck Dr. Lind. "We often observe," he says, "our channel cruisers overrun with scurvy; while their consorts, fitted out at the same port, and consequently with the same state of provisions, and striking out into the main ocean, upon a voyage to India, or upon a much longer cruise off the Canaries, or Cadiz, keep free from it." He also remarks that the warrant officers, who lie in warm dry cabins, and go better clothed, are seldom attacked with it; while the common sailors, exposed to wet, and whose berths were seldom dry, were almost destroyed by it. Spirits are said also greatly to predispose to this disease.

Pathology.—The days of scurvy were not those of posthumous examinations, and our knowledge of the pathology of this disease is derived principally from Poupart and Lind. In those cases in which flux or dysentery is absent, the intestines, however copious the hæmorrhage from them, have been found perfectly sound. The principal effects of the disease were observed in all cases in the cellular tissue of the extremities. The quantity of congealed blood effused in that part, even where no stain or mark could be perceived on the skin, was quite astonishing. "It often lies," says Lind, "in large concrete masses on the periosteum, while the bellies of the muscles of the legs and thighs seemed quite stuffed with it, often an inch in thickness." He also often found water effused into the cavities of the chest and abdomen, and no less frequently blood, —the quantity of blood effused in all parts sometimes amounting, in his opinion, to no less than a fourth part of that contained in the whole body. Poupart gives some further particulars, and says that, on moving the limbs of some scorbutic patients, a noise is heard; and that, on examining the joints, the epiphyses had entirely separated from the bones; and in other cases, that the cartilages of the sternum had separated from their bones. He says, also, if we squeezed the ribs which had begun to be thus separated from their cartilages, "there came out abundance of corrupted matter, so that nothing was left of the rib but its bony plates." The mesenteric glands, also, were usually enlarged, the spleen often three times bigger than natural, and fell to pieces as if composed of coagulated blood. In two cases lately examined at St. Thomas's Hospital, patches of ecchymoses were found under the pericardium covering the heart, and also under the arachnoid membranes covering the brain.

Symptoms.—Scurvy is divided into two kinds, or into sea scurvy, *scorbutus maritimus;* and land scurvy, or *purpura scorbutica.*

The first symptoms are, a yellowness of countenance, great depression of the physical powers, followed by the gums swelling, becoming *spongy*, and readily bleeding. A small puliose eruption (like flea-bites), of a purple hue, is next seen on the lower extremities; and about the same time the muscles of the leg or thigh become hard and painful, and in a day or two the skin over the pained part becomes first yellow and then purple. This discolouration forms patches sometimes as big as the palm of the hand, and then again extending over half the leg and thigh. The tongue is now white, the breath fœtid, and the stools generally pale. As the disease advances, all these symptoms are aggravated. The loss of physical power increases, the purple spots have a tendency to ulcerate, and the ulcers are distinguished from all others by their putrid fungoid appearance and great tendency to bleed, old sores open, and the callus of broken bones has even been dissolved and their ends separated. Profuse hæmorrhages also frequently take place from the mouth, nose, lungs, or bowels. The teeth also become loose, so that they either fall out or may be taken out by the finger and thumb. The pulse hurries on to 120 or 140, and at length the patient sinks from diarrhœa or dropsy, and with effusion so sudden that he perhaps has walked to be shaved, and then died in a quarter of an hour afterwards. The duration of the disease is generally many weeks, and sometimes, under the most favourable circumstances, many months, the patient recovering his strength extremely slowly.

The land scurvy is a much milder disease, the patient preserving his general good health. The legs, however, swell, and are painful and covered with petechiæ or patches of ecchymosis. The duration of this form of the disease is also often long and tedious, lasting many weeks or months.

Diagnosis.—The scurvy is to be distinguished from flea-bites, bruises, petechial fever, and from purpura syphilitica.

Prognosis.—In the present day, when the patient can command medical care and proper diet, the scorbutus maritimus, though tedious, is seldom fatal. When these, however, have been wanting, the mortality has been terrible. Lord Anson, it should be remembered, in his voyage round the world, lost above 200 men, and at last could not muster more than six foremast men in a watch fit for duty. At the commencement of the late war, on the fleet returning from sea, it often happened that so many men were landed ill of scurvy, that even Haslar Hospital, large as it is, could not contain them, and many were lodged in the chapel, others in tents, while others died in the boats before reaching the shore.

Treatment.—The early history of navigation, as it records the greatest ravages of scurvy, so does it also record the best antidote to the disease. Lord Anson's people, on reaching the island of Tinian, were recovered principally by eating oranges, of which that noble, brave, and experienced commander was so convinced, that, before he left the island, he ordered one man from each mess to lay in a stock for future security. Sir Charles Wager's people, also, were terribly afflicted with scurvy in the Baltic. Sailing, however, in the Mediterranean, and having heard how effectual oranges and lemons were in the cure of this disease, he took on board, at Leghorn, a large quantity of them, ordered a chest each day to be brought on deck, and allowed the men, besides eating what they chose, to mix the juice with their beer, and also to pelt each other with the rind, so that the deck was strewed with the fragrant liquor. By these means he brought his men home in good health.

In the year 1747, Dr. Lind made some comparative trials between this and some other modes of treatment, as vinegar, vitriol, and tamarinds, on board the "Salisbury," at sea. As a general conclusion from his experiments, he affirms that orange and lemon juice, or more properly, the citric acid obtained from all the species of the botanical genus *citrus*, or the natural order of fruits called *hesperidæ*, are greatly more efficient than any other remedy in the cure of scurvy.

Notwithstanding this strong opinion of Dr. Lind, the navy continued to suffer severely from the scurvy for half a century, till the Admiralty gave a general order for the supply of lemon-juice. This salutary measure was accomplished by a representation from the Medical Board of the navy, in the year 1795, when Lord Spencer was First Lord of the Admiralty, after a trial made on board the "Suffolk," of seventy-four guns. This ship sailed from England on the 2nd of April, 1794, supplied with a quantity of lemon-juice sufficient to serve out two-thirds of a liquid ounce daily to every man on board, and this was mixed with their grog along with two ounces of sugar. She arrived at the Madras roads on the 11th September, after a passage of twenty-three weeks and one day, without having had any communication with the land, without losing a man, and having only fifteen on the sick list. Scurvy appeared in a few of the men during the voyage, but disappeared on an increased dose of lemon-juice being administered. "Let this fact," says Sir Gilbert Blane, "be contrasted with the state of the channel fleet, in 1780, when Admiral Geary's fleet returned into port, after a ten weeks' cruise in the Bay of Biscay, with 2,400 men ill of scurvy; and let the state of this fleet be contrasted with that of the channel fleet in 1800, which, by being duly supplied with lemon-juice, kept the sea four months without fresh provisions, and without being affected with scurvy."

It is, perhaps, hardly fair to attribute the improved health of the navy entirely to the introduction of a daily allowance of lemon-juice, considering that the quantity was greatly increased and the quality of the diet greatly improved contemporaneously with this addition. It is gratifying, however, to see how largely these combined measures have improved the health of the navy and rewarded the cares of those who superintend it; for, during the nine years preceding these changes, the sick seamen sent to the hospitals were one in 3·9, while in the nine succeeding years the proportion was only one in 8·4; so that not only has scurvy almost disappeared from ships of war and naval hospitals, but the efficiency of the navy has actually been increased threefold. The negantia in sea scurvy are bleeding and mercury. When the patient has been bled it has been found that the red globules and fibrine are decreased and the albumen increased; the red globules being 119, the fibrine 1·6, and the serum 86 (Andral).

The citric acid, however, although an antidote to sea scurvy, is by no means so with the *land scurvy*. In this latter disease, contrary to the former, the patient is generally benefited by the application of leeches to the legs, and by moderate purging. The cathartic is perhaps unimportant, but the sulphate of magnesia ʒj. ex infusi rosæ ℥ſs. ter die, is often efficient.

The diet in every form of scurvy ought, as far as possible, to be fresh meat and vegetables; and, where it can be procured, a daily allowance of wine or porter. It is said that two vessels went on shore on the inhospitable coast of Greenland; one saved salt provisions enough to carry them through the winter; while the other lost everything, and the crew were obliged to live on what accident threw in their way. On the return of the whalers the following spring, the crew of the former had all died of scurvy, while the crew of the latter were still living.

Of the Effects of Alcohol.

> "Dulce periculum est:
> O Lenæe sequi Deum
> Cingentem viridi tempora pampino."

The number of persons that die from diseases produced by alcohol is calculated to be at least one-fourth of the whole adult male population, together with a considerable proportion of adult females of the lower classes. This estimate will appear less extraordinary, when it is stated that, besides producing intoxication, this fluid, like other poisons, is absorbed and mingles with the blood, and may be obtained from the blood by distillation. Its presence in the circulating system is not harmless, for it causes many organic as well as functional diseases. The organic diseases are altered structure of the arteries, also of the liver, of the stomach, and of the kidneys. The effects of alcohol on the arteries, and especially of the aorta, as constantly seen in the drunkard, are thickening and thinning, ulceration and ossification of the coats of those vessels, and in this manner their elasticity is destroyed, and they are rendered pouchy and aneurismal. The diseased state of the arteries re-acting on the heart produces enlargement and hypertrophy of that organ, till the whole balance of the circulation is destroyed, and the patient rendered liable to apoplexy, asthma, and dropsy. Besides the specific effects of alcohol on the arteries, it likewise affects the liver, which usually becomes enlarged, hardened, and granular. The stomach, also, is generally indurated, thickened, and contracted, while the kidneys are liable to every species of disorganization.

Such are the structural lesions alcohol produces; but in addition to these, many functional diseases result which often end in the death of the party: thus it is intimated that one-third of all the cases of insanity arise from habits of inebriety. In some persons, indeed, every fit of intoxication is a fit of insanity, and most of the murders, acts of incendiarism, of insubordination to military discipline, or of brutal violence, are committed during the paroxysm. The diseases of function it is now intended to note, and which are the immediate result of alcohol, are *delirium tremens*, or the consequences of several days continued intoxication, and *asphyxia temulenta*, or the fatal consequences of drinking to great excess at one bout.

Delirium Tremens is a general and excessive disturbance of the functions of the cerebral and nervous systems, causing sleeplessness, hallucinations, great trembling of the hands and upper extremities, with or without fever, and is a disease which runs a short and often fatal course.

This disease was little known till Dr. Sutton called the attention of the profession to it in the beginning of the present century, as an affection he often met with among the smuggling sea-faring population on the coast of Kent. Since that time it has become well known, and 206 cases died from it in 1839 in England and Wales, while the returns from the East and West Indies show that it is frequent in our colonies.

Remote Cause.—The party affected with delirium tremens is not the wine and beer drinker, but the drinker of spirits to such excess as to be in a continued state of intoxication for several days. It is consequently most usual in London about holiday time.

Predisposing Causes.—Both sexes are liable to this affection, and of the 206 who died in this country of this disease in 1839, 184 were men, and 22 women, and we regret to add that this proportion of females is greater than in many continental towns.

Pathology.—The pathological phenomena which have been discovered on the inspection of those who have died of delirium tremens have been a few more *puncta cruenta* than usual of the brain, and also some thickening or congestion of the membranes, with effusion into the cavities of the arachnoid and of the ventricles. In some very few instances the fluid in the ventricles has smelt of the spirit that has been drank, and so also has the blood drawn from the arm.

Symptoms.—The symptoms of delirium tremens generally appear from the second to the eighth or ninth day after a protracted debauch, and are by some pathologists divided into three stages. The first stage, according to Dr. Blake, is marked by a peculiar slowness of the pulse, by coldness and clamminess of the hands and feet, by general debility, by nausea and vomiting in the morning, and by frightful dreams at night. The tongue, also, is tremulous and furred, the hands shake, the patient is greatly depressed in spirits, sighs frequently, is anxious about his affairs, and is either restless or watchful. These symptoms last from 24 to 48 hours.

The second stage commences by a hurried and anxious manner, by great excitability of temper, by a small accelerated pulse; some heat, perhaps, of the surface of the trunk, but accompanied with the same coldness and clamminess of the extremities. The tongue is sometimes clean, but often brown and dry, and the patient delirious, suffering from various mental illusions and alienations. In general, the delirium is melancholy, and has reference to his usual occupation and habits, or to some difficulty in his domestic affairs. He sometimes sees flames, or hears voices talking to him; and one man, as soon as he shut his eyes, saw people passing under the bedclothes. Restless and sleepless, he moves his trembling hands horizontally over the bed-clothes, as if seeking for something. In general, he is harmless, and easily controlled; but in some instances the party is violent, mischievous, and requires to be strapped down in bed. This stage generally lasts from three or four days to a week, when the third stage commences by the patient falling into a sound sleep, and gradually recovering, or else a fatal collapse comes on, which finally and shortly closes the scene.

Diagnosis.—Delirium tremens is to be distinguished from typhus fever and from paralysis agitans only by the previous history.

Prognosis.—It is hardly determined what is the proportion of recoveries to deaths, but unquestionably three persons out of four do well.

Treatment.—The rule of treatment in this disease is by opiates and stimuli. In mild cases, when the tongue is *white*, many recover under mist. camphoræ ℥ xj. sp. æth. nitr. ʒ j. c. syr. papaveris ʒ j. vel tinct. hyoscyami ♏ xx. 4^{tis}. In severe cases, when the tongue is either clean or brown, one or two grains of morphine or of opium, given every two hours till sleep is procured, has entirely cured the patient. It is, generally, however, necessary to support the patient for some days after by camphor mixture, and by a small portion of wine and water, or brandy and water. By physicians who have attempted the heroic treatment, as much as ℥ſs. of tinct. opii, or 20 grains of opium, have been given at a dose in these cases, but this appears to be in great excess.

The dietetic treatment should be slops and light farinaceous food.

Asphyxia Temulenta.—Delirium tremens is generally the result of some days' hard drinking; but some persons, either through bravado, for a wager, or from ignorance, have been tempted to drink one or two pints of spirits at one draught. In these instances the effects of the poison are widely different from the delirium tremens caused by long-protracted debauch, for instead of excitement, delirium, and tremor, the brain becomes oppressed, and the patient falls down, and lies without any power of voluntary motion, without consciousness, and almost without sensation, and in this state he frequently and shortly dies.

Pathology.—On examining the bodies of those who have died during intoxication, the appearances observed are those of asphyxia rather than of apoplexy. The appearances, indeed, are rather external than internal; the countenance bearing marks of anxiety, and sometimes of convulsions; the eyes being prominent, and the pupil dilated; the face swollen and livid; the lip blue; the cellular tissue vascular, and its blood dark and fluid; all the abdominal and pectoral viscera likewise are loaded with dark fluid blood, as also the brain and its membranes. The veins and larger arteries, as also both sides of the heart, are loaded in like manner with black blood. Some effusion is likewise observed in the cavity of the membranes of the brain, and also into the ventricles, but it is small in quantity, and perhaps is merely a consequence of the agony. These appearances seem to denote a specific action of the alcohol on the nervous system, producing instantaneous palsy of the eighth pair, as well as of the functions of the brain generally.

Symptoms.—In the great majority of cases, shortly after taking the spirits, the party* becomes drowsy, if sitting, and appears to fall into a sound sleep, but, if standing, he falls down; while if the attempt be made, he cannot be roused to consciousness, or only partially so, and then immediately relapses into the same comatose state. His limbs remain motionless, or, if lifted up, fall powerless; his face is pale or flushed; his eye injected, sometimes squinting, and the pupil either contracted or dilated. The temperature of his head is above that of the trunk, which is either natural, or below the usual standard. The pulse is feeble, slow, varying from 70 to 108, and often entirely wanting. The breathing slow, and if the hand be placed over the chest, no expansion is felt, the respiration being altogether abdominal. In four cases, says Dr. Ogden, the patients manifested no sense of feeling, either when the skin was pricked, or the nostril tickled with a feather. The patient generally dies convulsed.

Diagnosis.—The disease is distinguished from apoplexy, or other disease, by the breath being tainted with spirits, and also by the history of the case.

Prognosis.—A very small number of cases recover from this extreme state of intoxication, but when the pulse is wanting at the wrist, the patient cold, and the respiration laborious after the alcohol is removed from the stomach, the case is hopeless.

Treatment.—The practice is, in the first instance to empty the stomach, either by an emetic, or by the stomach-pump, to apply external warmth, and to exhibit diffusible stimuli, as ammonia; or, according to Orfila, hot coffee; and, according to others, vinegar. The practice of blood-letting, when called to a patient suffering from an overdose of ardent spirits, though a common is yet generally esteemed a most pernicious error.

Colica Pictonum.

Lead has been introduced into the system, both formerly and in the present day, in a great variety of ways; formerly, in France, from putting a lump of litharge or lead into *vin gâtée*, in order to render it saleable, a crime which has been made capital in most countries of Europe; and from this having been practised to a great extent in Poiton, the disease has been termed *Colica Pictonum.* In the cider counties of Great Britain this disease formerly existed to a great extent, and has been termed Devonshire colic, or *Colica Damnoniensis.* The impregnation of cider with lead in this country was generally the effect of accident, and arose from the troughs in which the apples were crushed having the different pieces of stone, of which they are composed, cramped together with iron, and fixed by melted lead. In some districts it was the practice to line the entire press with lead, or else to tip them with that metal. It was a custom, also, almost universal to make the upper part of the boiling vessel of lead, while some growers, in managing weak ciders, put a leaden weight in the cask to sweeten the liquor. From these and perhaps other causes, Sir George Baker found the cider he examined to contain 4½ grains of lead in 18 bottles, or a quarter of a grain in each bottle. In the West Indies, these diseases appear to have been produced by using leaden worms to the stills, by which the rum became impregnated with this metal. There are many other minor sources of poisoning by lead, as keeping pickles or preserves in glazed earthen vessels, and colouring sugar-plums with lead; while many children formerly suffered from eating wafers coloured with red lead—*cognitio causæ tollit morbum;* and the still and other machinery used in the distillation of fermented liquors being now constructed of metals so combined as not to be acted upon by acid fruits or sugar, these diseases are no longer epidemic, but are confined principally to labourers in the lead manufactories and to painters.

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* Ogden, *Medical and Surgical Journal*, vol. xl.

Predisposing Causes.—All ages, both sexes, and all classes are liable to the poisonous action of this metal, but the workers in lead have been at all times the greatest sufferers. Women in this country often suffer from colic, but it is rare to find them paralytic; men suffer both from the colic and the palsy.

Pathology.—The theory of this disease is, that the lead is absorbed and mingles with the blood, and produces that functional disease of the fibrous structure of the alimentary canal, termed colic; also of the muscles of the extremities, producing palsy, and likewise ulceration of the gums and alveolar processes, accompanied by a peculiar blue line, and which has only lately been pointed out by Dr. Burton, of St. Thomas's Hospital.

The fact of the lead being absorbed and mingled with the blood is demonstrated by the circumstance that lead has been obtained from the coats of the stomach of a dog poisoned by lead, even as late as a month after poisoning. Again MM. Duvergie and Guibourt have detected lead in the brain of the human subject, and Dr. Budd has detected it not only in the human brain, but also in the muscles. Many pathologists, also, are inclined to believe that the blue line observed in the gums of persons poisoned by lead is owing to the presence of lead in some peculiar state of combination. It follows, from what has been stated, that there are various tissues of the body for which lead has an affinity, and that it enters into chemical combination with them.

Colica Pictonum rarely causes death in the present day, but the facts we do possess show it to be a disease of function and not of structure. Dehaen opened many persons that fell from this disease, and says he found in all a constriction of the colon, and in a certain number a similar affection of the cœcum. Merat opened, also, seven cases, and all that he observed was a constriction of the colon. Dubois de Rochfort says that he found in two cases intussusception of the intestines; but Andral, however, has examined five cases, Louis one case, and Martin another, without finding any morbid appearance.

Mr. Hunter had an opportunity of examining the state of the muscles of the palsied hand and arm of a painter who died of a broken thigh in St. George's Hospital, and found them all of a cream colour. Dr. Williams, however, of St. Thomas's Hospital, had an opportunity of examining the palsied muscles of the arm of a painter, but they had an entirely natural appearance, though wasted. Dr. Budd had also an opportunity of examining a similar case at King's College Hospital, yet, although the extensor muscles of the wrist and muscular fibres of the colon were examined under a microscope, nothing unusual was discovered, except that the extensor muscles, like palsied muscles in general, were more easily separable into their component parts than in health.

Symptoms.—The quantity of lead necessary to produce its specific results, or the time it takes to accumulate in the system when introduced, is not determined, and both the dose and the time, perhaps, varies greatly in different individuals. Sometimes all its most pernicious effects are produced by one dose taken by the mouth; and then again, if introduced by the skin, months and even years may elapse before the system is laid under its influence. As a general rule, however, a much smaller dose will produce colic than is necessary to produce palsy.

When the dose is of such intensity as to produce colica pictonum; the symptoms do not differ, except in being of greater intensity from those which have been stated as marking ordinary colic. There is the same dragging and twisting pain, and the same relief by pressure; the same absence of fever; the same unhurried pulse; the same constipation, only more obstinate, and in the worst cases the same vomiting. Andral, however, who has treated upwards of 500 cases at La Charité in the course of eight years, says it is not strictly true that the pain in lead colic is always diminished on pressure, for in the greater number of cases pressure neither augments nor diminishes the pain, while in some cases the sufferings of the patient are increased by it. He also says it is as common to find the abdomen distended with gas as to find it drawn in, and the rectus strongly contracted. The symptoms peculiar to this form of colic are, occasionally an attack of epilepsy, and an ulcerated state of the mouth, accompanied by a blue line on the dental edge of the gum,—a discovery which the profession owe to the patient and careful observation of Dr. Burton.

The duration of colica pictonum is very various: in one instance lately, in St. Thomas's Hospital, fifteen days had elapsed without a stool. More commonly, however, only three or four days elapse before a stool is procured, and when the case is early submitted to medical treatment seldom more than a few hours. As soon as the bowels act the great severity of the disease is mitigated; every symptom is gradually relieved, and the disease generally terminates within a week.

When palsy is the result of the absorption of lead, a painful state of the arms often precedes it, which at length terminates in palsy. The palsy is in general limited to the upper extremities, when it may be partial or confined to the hands, causing the "wrist drop," or

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to one finger. More commonly, however, it affects the whole arm, and sometimes so completely that the patient can execute no movement with it, and when lifted up it falls like an inert mass. Again, sometimes the extensor muscles of the limb are alone affected, and in this case the hand is often strongly closed by the powerful and unresisted action of the flexors. In general both arms are palsied, but not equally so, one being something more affected than the other. Supposing both sets of muscles to be equally palsied, the patient usually recovers the use of the flexors before that of the extensors, so that he can carry a pail of water before he can shave himself. This restoration of the lost power is usually accompanied by pain. In a very few remarkable instances the lower extremities are equally affected, an example of which is now in St. Thomas's Hospital, the extensor muscles being palsied, and the patient walking as if slip-shod, or like a bird. The duration of the palsy under any treatment is always long, and often lasts many months, and in some cases, many years. Both colic and palsy may occur an indefinite number of times. When epilepsy, which is a rare symptom, is produced, the fit does not differ from epilepsy of the ordinary character.

Diagnosis.—This colic can only be distinguished from ordinary colic by the history of the case, and by the blue line on the dental edge of the gums.

The palsy is distinguished from cerebral paraplegia by the history of the case, by the integrity of the intellect, and by the blue line on the gum.

Prognosis.—The termination of lead colic, except where the dose has been in such excess as to produce death in a few hours, is always favourable.

The palsy does not appear greatly to affect the health of the patient, but in some cases it has hitherto not been cured or relieved. In general, however, the patient does recover, although, perhaps, not completely.

Treatment.—The treatment of colica pictonum is extremely simple. The objects to be obtained are to procure stools and allay pain. For this purpose five grains of calomel, fifteen grains of jalap, and one grain of opium should be administered as soon as the patient is seen, and at the end of two hours the mistura camphoræ ℥ij. c. magnesiæ sulphatis ʒj. c. tinct. hyoscyami ♏xx. should be given every two or every four hours till the bowels are freely evacuated, when relief more or less complete is obtained. The mixture should be continued at proper intervals for three, four, or five days, when the patient, though greatly weakened, has in general recovered.

In a few cases, however, the pain continues, and with considerable severity, after the bowels have been freely evacuated. The practice in these instances is to apply a blister to the epigastrium and to keep it open for a few hours; and this additional application completes the cure. Calomel to salivation has not appeared to influence the disease beneficially, and bleeding is decidedly bad practice.

In addition to the purgative treatment, the patient is much relieved if placed in a warm bath, and so simple is the treatment of this colic, that Dr. Wilson, of the Middlesex Hospital, affirms, if the patient be now directed to inject repeated enemata of the water of the bath, that stools will be readily obtained. In the absence of the warm bath a large linseed or mustard poultice should be applied over the abdomen.

With respect to the cure of lead palsy, an endless variety of treatment, both local and general, has been tried, but with so little positive result, that when the patient has recovered it has been doubtful whether it has been owing to the great length of time that has elapsed, or to the medicines he has been taking. There is only one medicine that appears an exception to this rule, and that is the ergot of rye (secale cornutum), and there is some hope that this is a specific for the disease in doses of gr. x. ter die. As far as it has been tried, it produces a considerable increase in the power of the flexor muscles of the arm in about a fortnight, and the improvement gradually extends to the flexors till at the end of about three months the patient has recovered. Supposing this medicine to prove a specific, in what manner does it act? Is it by imparting increased power to the nerves, or by combining with the lead incorporated in the muscular tissues, and rendering it more readily absorbable? The experiments of Orfila render it probable that lead is removed from the body by the kidneys, for on carbonizing a portion of urine of a young girl who had taken about an ounce of acetate of lead with an intention of commiting suicide, and treating the residue with nitric acid, and submitting it to the usual tests, he obtained a sensible portion of lead, showing that the kidneys are one of the means by which this metal is removed from the body.

FISH POISONING.

The subject of fish poisoning is one of the most singular in the whole range of dietetics. Many persons have an idiosyncrasy so peculiar that even cod or salmon will produce an eruption or other temporary disease. It is well ascertained that the oyster, and still more the muscle, at times acquires properties which render it poisonous or hurtful. Vancouver had four sailors taken ill, after eating muscles, of whom one died in five hours and a half. Two fatal cases also from the same cause occurred in the practice of Dr. Combe.

It has been thought that the muscle might acquire its poisonous qualities by feeding on a bed of copper, but Dr. Christison analyzed some muscles taken from the stomach of Dr. Combe's patient without finding a trace of copper; and subsequently it was ascertained that, so far from feeding on copper, the muscles in question had been taken from some Memel fir logs which had lain at the mouth of the harbour for fifteen years. The particular poison, therefore, must be an animal poison acting on a peculiar temperament.

The symptoms which poisoned muscles give rise to are great pains in the stomach, some fever, and a very general erythematous eruption; some also are said to suffer from coryza, and others from peritonitis, and these symptoms last for a week or ten days.

The treatment of poisoning from muscles is generally an emetic, and often bleeding and other rough treatment. It is singular, however, that the most efficient remedy is to drink copiously of milk. In what manner milk acts is uncertain; some imagine that the poison is mechanically entangled in the coagulum, and thus more easily brought under the action of digestion. The more probable mode, however, is, that the poison becomes chemically combined with the caseous portion in the same manner as corrosive sublimate unites with albumen, and is thus in a great measure rendered harmless. Whatever be the *modus operandi* of milk, it is certain that in a few hours the patient is relieved, and, by attention to the bowels, speedily recovers.

Besides fish poisoning, three common articles of food have often produced death in Germany, as sausages made a long time, and of meat that has been boiled before being salted and hung up; also old cheese and rusty bacon. Dr. Kerner has determined the poison of the sausages to be an acid formed in consequence of a modified process of putrefaction. Dr. Daun, however, affirms it to be the empyreumatic oil. Old cheese is supposed to be poisonous from the conversion of the curd or caseum into the caseate of ammonia, the caseic acid being said to be so poisonous that a drachm and a half procured from cheese killed a cat in eight minutes. The poison of rusty bacon is said to be sebacic acid and an acrid oil. Meats thus prepared are often sensibly obnoxious to delicate stomachs at a much earlier period of decomposition than is here pointed out. Thus many persons are unable to eat French pâtés, however delicately flavoured. The mode of treating the diseases caused by these poisons is not determined.

Of the Neuroses of the Liver.

The liver is the largest organ of the body, and has been found to weigh, in the healthy adult, from two to five pounds. It receives nerves from the eighth pair, thus putting it under the influence of the passions. Its office is to secrete bile, a fluid which all physiologists have considered of the first importance in the animal economy. What, however, is the peculiar purpose of bile is not determined; some physiologists consider it as subservient to digestion, and others that it is an excrementitious matter separated from the blood and removed by the alimentary canal, while others affirm that it acts as a natural tonic to the intestines, and regulates, perhaps, both the absorption of the chyle, and also the peristaltic motion. The neuroses of this organ are jaundice and gall-stones.

Icterus, *Jaundice*, the *Yellows*, is the absorption of bile and its circulation with the blood, whence many of the different tissues and fluids of the body become dyed yellow, but more especially the conjunctiva and the cutaneous tissue, for which the bile appears to have a great affinity.

This disease was known to Hippocrates and to all succeeding writers. The term *icterus* is said to be derived from the complexion of the jaundiced person resembling the golden thrush, and by looking on which, like the Israelites of old on the brazen serpent, it was supposed the patient would be cured. Another odd term is *morbus arquatus*, from bad cases of jaundice presenting almost as many and as varied colours as the rainbow. 800 cases of this disease died in England and Wales in 1839.

Remote Cause.—The bile, although constantly secreted, is only poured into the duodenum at the time when digestion is going on, being in the interval received into the gall-bladder. Any defect, therefore, of that sympathy which exists in health between the duodenum, the gall-bladder, and hepatic ducts may cause the bile to be retained and the patient to be jaundiced. Among the causes of jaundice, therefore, may be enumerated every functional or structural disease of the stomach and duodenum, and also of the liver itself; and among the causes of the diseases of the latter organ, the paludal poison and excessive indulgence in ardent spirits may be mentioned as the most prominent. Mechanical causes also occasionally produce jaundice, as an enlargement of the head of the pancreas, or an aneurismal or other tumor pressing on the *ductus communis*. Dr. Young gives a singular case of jaundice in which a hydatid had got entangled in the *ductus communis*, and completely obstructed the passage. In this case the liver adhered to the diaphragm, and the diaphragm to the lungs, and an abscess formed, so that all these parts communicated with the bronchi, and pus and bile passed into the lungs, and was thus absolutely spat up by the mouth. Pregnant women are also often jaundiced, and as is supposed from pressure of the uterus.

As the brain is put in communication with the liver by means of the eighth pair, the passions often produce jaundice. A woman was upset in a boat on the Thames, and the next day she was jaundiced. An untoward accident threw a lady into a violent passion, when in a few hours she was jaundiced. A medical gentleman is mentioned by Mr. Cooke who became jaundiced every time he had a difficult case under his care, and a young man is stated by Morgagni to have become jaundiced from having a gun pointed at his breast.

Predisposing Causes.—New-born infants are liable to jaundice, and it may occur at any subsequent age. It is most common in the heyday of the passions, or between 20 and 40. Women are supposed to be more liable to this affection than men. In some few instances jaundice appears to run in families, for Mr. Pearson speaks of a family of 17 children, of whom 10 had died shortly after birth of jaundice, and another about six years old.

Pathology.—Jaundice, though often a result of every organic disease of the liver or duodenum, yet often occurs when those organs are perfectly healthy, and is consequently in many cases merely a disease of function. On posthumous examination, besides the yellowness of the cutis, the serum of the blood is generally found loaded with bile and perfectly yellow; and in one case of *icterus arquatus*, singular to say, though the patient was yellow, yet the serum of the blood taken by cupping was green, and from which, nevertheless, the albumen, on the addition of nitric acid, was thrown down yellow. If the disease is at all chronic the fat is also yellow, as well as the bones and cartilages. All the serous fluids are likewise yellow, and even the milk is said to be expressed yellow from the breast of a suckling female.

The theories that have been formed to account for jaundice, are, that the bile exists formed in the blood, and is merely removed by the liver, and consequently jaundice is a consequence of the non-separation of the bile. A more common opinion is, that bile is a secretion and not a separation, and consequently that in jaundice the bile is first secreted and then absorbed both by the veins and lymphatics, while Portal has proved that it may be absorbed in a third manner, or by the lacteals. Every attempt to prove by experiment whether bile is secreted by the arteries or veins has been either unsatisfactory or has failed; but reasoning from the structure of the liver, and that the portal vein ramifies after the manner of an artery through this organ, most physiologists have concluded that this latter vessel is the great secreting system of the bile.

Symptoms.—Jaundice, from the different intensities of the colour of the skin, has been divided into the yellow, the green, and the black jaundice.

Jaundice, arising from functional disease, may be sudden in its attack, or it may be preceded for a few

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days by great depression of spirits, lassitude, and somnolescence. It may also be preceded or accompanied by some slight pain in the region of the liver, but more commonly pain is not present.

The first symptom of jaundice is a yellowness of the white of the eyes, then of the roots of the nails, or of that part termed "the half-moon;" the yellowness next appears over the face and neck, and ultimately over the trunk and upper and lower extremities. As soon as the eyes are affected the urine becomes of a deep red colour, and stains linen steeped in it yellow, and if nitric acid be added it is changed to a deep green. The bile, however, is not always in the same state of combination in the urine, or else not of the same quality; for, in some instances, where the colour of the patient is most marked, and the urine of its deepest hue, the addition of nitric acid effects no change. At the same time the urine is thus discoloured, the stools, often abundant in quantity, are copious and white. The pulse is slow, and the patient complains of a bitter taste in the mouth, has much thirst, an absolute inaptitude to all exertion, and suffers from a lowness of spirits, amounting to hypochondriasis. In general the bowels are irritable and easily acted upon; but, in a few cases, they are constipated. If the patient recovers, the first symptom is the appearance of bile in the stools, and after this the yellowness fades away in the inverse order of the attack, or first from the legs, trunk, chest, face, and, lastly, from the eyes; and in proportion as the yellowness disappears from the body the bile in the urine decreases, till at last it disappears altogether. On the contrary, if the patient falls, his death is generally preceded by delirium or dropsy.

The duration of this affection is very various. In some cases it terminates in about ten days, but more generally it lasts from three to six weeks, and, if badly treated, oftentimes as many months.

As the serum of the blood is yellow, and all the serous secretions are occasionally yellow, even to the semen and saliva, we can hardly feel surprised that Dr. Cheyne should mention the linen being sometimes dyed yellow by the perspiration; neither can we feel surprised that, to the jaundiced eye, "all things seem yellow." The patient, however, more commonly possesses his natural sight, and only in a few instances "sees yellow." Dr. Pemberton saw this phenomenon but twice. Dr. Elliotson also gives but two cases, or one in which the patient saw yellow with both eyes, and one in which he saw yellow with only one eye. The cause of this has been supposed to be the discoloured yellow serum circulating through the lenses and coats of the eye, or else that the aqueous humor must be tinged with the bile. The latter was examined in one case of a patient that saw yellow, but the colour of the humor was natural.

Diagnosis.—This disease is to be distinguished from chlorosis and that sallow state which results from profuse uterine hæmorrhage. In these complaints the white of the eye is blue, the urine limpid, and the stools healthy, so that the great characteristics of jaundice are wanting.

Prognosis.—In those cases of jaundice in which no mechanical obstruction or organic disease exists, the proportion of recoveries to deaths is large. Indeed, the restoration of the patient is almost certain. On the contrary, when it results from organic lesion, the death of the patient is much more usual than his recovery.

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Treatment.—As a general principle, the larger number of cases of jaundice from functional disorder, perhaps four out of five, will get well on very trifling remedies. Two cases recently in St. Thomas's Hospital recovered by taking merely ℈j. of the carbonate of soda ter die, while two other cases recovered by taking the sulphate of magnesia ʒ ſs. to ʒj. with tinct. hyoscyami ♏ xv. out of camphor mixture, also three times a-day, and similar cases would perhaps do equally well on small doses of rhubarb or of castor oil.

It was formerly the practice to treat almost every case of jaundice by mercury; and, 30 years ago, hardly a case was admittted into St. Bartholomew's Hospital that had not been previously salivated, a circumstance which shows the extent to which this medicine has been tried, and that its exhibition is not by any means uniformly successful in the cure of this disorder. It is observed, also, when mercury fails, its effects are in many cases decidedly injurious; for a common jaundice is often turned into a black or green jaundice, which are the worst cases we meet with. There are a few cases, however, but perhaps not more than 1 in 9 or 10, in which the jaundice resists all other remedies, and yet is cured by mercury given in moderate doses, either of blue pill or of calomel, till the gums are sore. But the particular case is not to be distinguished by any peculiarity either in the history or symptoms from those that readily yield to more simple remedies, with only one exception, or the persons who almost live in a mercurial atmosphere, as the nurses of the foul wards, and these are often attacked with jaundice, and are only cured by the use of mercury. There is another class of jaundice, or that from ague, which readily yields to mercury, but, in case after case, resists a treatment by neutral salts.

As the cases which require mercury are few in number, it is desirable, in every instance, to treat every patient for 10 days or a fortnight with neutral salts, not only as offering the greatest number of chances of recovery, but also as sparing the larger number the unnecessary miseries of salivation. At the end of a fortnight, if no improvement be visible, it is then desirable to exhibit greater or less doses of mercury. In general five grains of blue pill once or twice a-day are sufficient, combined with some slight opiate.

There are cases which will not yield to the neutral salts ordinarily in use, and are only partially relieved by mercury; and in these instances the manganesii cum ammonio-sulphatis ʒ ſs. to ʒj. ter die, has often cured the patient when the preceding measures have failed.

In many cases the modes of treatment which have been mentioned are rendered much more beneficial if combined with some light vegetable or mineral tonic, as the infusi aurantii, cum tinct. aurantii ʒj. to ʒ ij., or else the tartrate of iron, 5 to 10 grains, may be added to each dose. The mineral waters of Cheltenham and Leamington, in which a neutral salt is naturally combined with iron, are known to be excellent remedies in most cases of jaundice.

Many practitioners make a practice of bleeding or cupping in almost every case of jaundice, a mode of treatment for which perhaps no sufficient reason can be alleged, for pain is seldom present, or any symptom to warrant it. It is a maxim, however, with Mr. Hill, in cupping jaundiced patients, not to cut deep; for although little blood flows in general while the cupping-glass is on, yet, shortly after it is removed, hæmorrhage often takes place, and there is great difficulty in stopping it. One patient in St. Thomas's Hospital recently died from this circumstance.

The diet of the jaundiced patient should be light; fish, puddings, and slops should be substituted for meat and poultry, and this abstinence should be persevered in till the patient is well.

Of Gall-Stones or Hepatic Calculi.

Human bile has been analyzed by many modern chemists, and especially by Thenard, Berzelius, Vauquelin, Vogel, and Chevreul, but they have all arrived at different results. That by Berzelius is the most received, and is as folllows :—

Water	907·4
Biliary matter	80·0
Mucus	3·0
Salts	9·0
	999·4

Or, according to Thenard, it consists of—

Water	700·0
A green resinous matter or peculiar principle	15·0
Picromel	69·0
Salts	17·5
	801·5

In its healthy state it is of a deep yellow colour, extremely bitter, a little heavier than water, and miscible in that fluid in every proportion; and that in the gall-bladder is usually of the consistency of thin molasses. As it contains a little free soda it is alkaline, and its solid contents principally resolvable into a very large proportion of carbon and a small quantity of azote.

This fluid is liable to undergo many morbid changes; thus it is found green or yellow, and those colours may be pale or intense; or it may be as fluid as water, or as viscid as tar. Its taste is also greatly affected, it being sometimes bland, and at others so acrid as to excoriate the lip. These different states do not denote different states of the liver; for the same condition of bile is found in the most oppositely diseased states of the liver, so that they must be looked upon chiefly as resulting from diseases of function. The most remarkable, however, of the states of diseased bile is that in which it concretes into a gall-stone. The disease was known to the ancients, but the chemical composition of these calculi has been determined by the labours of the moderns, or by Fourcroy, Poultier, Powel, Chevreul, and others.

Remote Cause.—The remote causes of this disease are supposed to be too full an animal diet, combined with a sedentary life, or the indulgence of anger or of those other passions which suppress the flow of bile, and perhaps alter its qualities; also those states of indigestion which re-act on the liver. This affection, however, is not necessarily connected with ill health, for calculi have been found in the gall-bladder of persons who have died accidentally, and apparently in the best health.

Predisposing Causes.—This disease appears to be peculiar to adults; generally occurs after 20, but is, perhaps, most common between 40 and 60. It is supposed to affect women rather than men, and persons of sedentary rather than those of active habits of life.

Pathology.—Biliary calculi are often found filling the gall-bladder when the structure of the liver and gall-bladder is perfectly healthy; they are, therefore, a consequence of functional disease. Their principal seat is the gall-bladder, but they have been found "*in transitu*" in the cystic duct and in the ductus communis. Occasionally they have been found in the hepatic ducts, but so rarely that this fact is very generally doubted. Cruveilhier, however, has given one instance in his very splendid work on pathological anatomy, and Ruisch another. Lastly, they are sometimes found in the intestinal canal, after having passed from the gall bladder into that cavity.

Although the liver is frequently found healthy when the gall-bladder contains calculi, yet more commonly perhaps its structure is more or less diseased, and the lesion may be of every description to which that viscus is liable; thus it may be harder or softer, granular, or otherwise diseased. In some instances the ductus cysticus is obliterated, in others the gall-bladder is thickened or ulcerated; and if the body be examined shortly after a large gall-stone has passed into the intestine, the ductus communis, so small in health that it is difficult to find it, is then so enlarged as to admit the finger. In some very rare instances the extremity of this latter duct has been found obliterated from inflammation, in consequence of the irritation to which it has been directly or indirectly subjected.

The modern chemists have determined that gall-stones are composed principally of two substances, cholesterine and colouring matter, in various proportions, together with some animal matter, the usual salts, and perhaps a trace of iron. Cholesterine, which sometimes exists in the large proportion of 88 to 94 per cent. of the whole calculus, is soluble in boiling alcohol, æther, and in nitric acid. It is tasteless, inodorous, and burns by the flame of a lamp till it is altogether consumed. It is also lighter than water, and insoluble in that fluid. Its constituent elements give it much resemblance to ambergris, and are—

	Cholesterine.	Ambergris.
Carbon . .	72·000 . .	84·088
Oxygen . .	6·666 . .	2·914
Hydrogen . .	21·340 . .	12·018
	100·	99·020

The colouring matter, also, which is generally combined with the cholesterine, and often forms of itself a large portion of the gall-stone, is inodorous, insipid, and heavier than water. It is likewise insoluble in that fluid, in alcohol, or in acids, but is soluble in alkalies, whence it is precipitated, on the addition of water, of a brownish green colour.

The calculi found in the human gall-bladder have been divided by Dr. Powel into crystallized, deposited, amorphous, and porcupine calculi.

The *crystallized* concretions, when fractured, look like spermaceti, and the crystals, like those of that substance, are easily broken into a sort of greasy powder. They are in general semi-transparent, but seldom retain their purity throughout, being, near their circumference, coated or mixed with more or less of a brown colouring matter. At the central point of these colourless crystals, to which the radii converge, there is mostly a small particle of coloured matter, resembling dried bile, and which has served apparently as the nucleus of crystallization. Sometimes this crystallized shoot, having

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reached perhaps the size of a pea, becomes itself a centre around which many depositions are afterwards made of various confused and irregular strata, and the surface of these strata may in their turn become the nucleus of a fresh crystallization.

The *deposited* gall-stone is a deposition of biliary matter in laminæ, like the arrangement of an onion or of an urinary calculus.

The *porcupine* calculi are small round calculi, having a number of projecting points, and hence termed porcupine calculi. They are generally small, and their structure has not been determined.

The amorphous concretions are such as bear no mark of crystallization, or of any very regular structure, but sometimes as they dry they break into layers, showing their mode of formation.

Biliary calculi vary considerably in their specific gravity; and this does not appear to depend on any peculiarity of structure; for, two of the purest specimens being selected, one swam while the other sank in water —a difference perhaps owing to the greater or less quantity of animal matter they may contain.

These calculi vary greatly in number, or from 1 to 1000. When single they are usually of a round or oval figure. In size they vary from a pin's head to that of a nutmeg or a walnut; and Dr. Baillie has seen one as large as a hen's egg. When extremely numerous, they are usually small, of a dark brown colour, and occasionally slightly agglutinated with viscid bile. When, however, the number is small, or from two, three, to eight, the size often is considerable, and in this case the gall-stone is often made up of several, loosely adapted or fitted to each other, showing they must once have existed in a soft state.

With respect to the formation of gall-stones, the cholesterine, not being a constituent of healthy human bile, is evidently a morbid product, and is secreted in a fluid state. From this, if a nucleus of any kind, as a piece of thick mucus, be present, crystals may immediately shoot or form upon it; and thus a person apparently in good health may in an instant have a large gall-stone formed in his gall-bladder. Dr. Powel thinks he has met with cholesterine in a fluid state in the gall-bladder of a patient he examined. The peculiarity of this bile was its remarkably deep and almost black colour, whence he was led to treat it with alcohol, and in this manner he obtained solid cholesterine. The deposited gall-stone must be formed by an excess of colouring matter, or else by some morbid state of the bile, in which that principle is readily separable when any nucleus is present.

Symptoms.—The formation of the gall-stone is unattended with pain, and the stone, once formed, often lies latent for a considerable time. At length, however, some cause forces it into the cystic duct, when a series of very formidable symptoms arise, and which continue till the calculus has passed into the duodenum.

The attack is generally sudden, the patient being seized with shivering, accompanied by violent and acute pain at the pit of the stomach, or rather at the point corresponding to the opening of the duct into the duodenum, and from this point it darts through the back. This pain occurs in paroxysms, varying from a few minutes to a few hours, when it intermits, and after a short interval returns, and this continues till the gall-stone has passed into the intestine. The patient during this trying period suffers from nausea or vomiting so severe that everything is rejected, and the matters thrown up often contain bile and small biliary calculi.

Pains and vomiting are the leading features of the passage of a gall-stone, and it is impossible for those who have witnessed it not to be struck with the resemblance many of its symptoms bear to those of parturition—a comparison women frequently make when describing their sufferings. There is this difference, however, that when the pain intermits there is a deep-seated soreness and fulness of the right hypochondrium and epigastric regions. Like parturition, then, one attack of pain succeeds another, till at length this more urgent symptom ceases, and the calculus may be inferred to have passed into the intestine. After that has taken place, the soreness and uneasiness gradually cease, and the patient is restored to health. In some cases, and at some early period of the attack, jaundice makes its appearance, and continues for a considerable time after the calculus has passed.

The pulse during the paroxysm is for the most part natural, unless the patient is exhausted by long continuance of pain. The heat of the body also is often increased, but it is not the heat of fever. The dejections, according as the obstruction is more or less complete, are clay-coloured or natural, and, by a close examination, are ultimately found to contain the offending calculus.

The duration of the attack is very various, sometimes only a few hours, sometimes a few days, while sometimes several weeks elapse before the gall-stone is expelled.

It has been imagined that the degree of angularity of these concretions must considerably influence the symptoms; this, however, is not the case, for their angles are never sharp enough to cut nor their points to pierce. Size is of more importance than shape, and in proportion to its magnitude so will be the opposition to its passage. The transit of one concretion, by distending the duct, necessarily facilitates the passage of a second.

The symptoms which have been described are the most usual, but sometimes they are exceedingly anomalous. In one case, a lady was seized with violent pain in the left shoulder, similating rheumatism. She then fell into a state of somnolescence so complete that even on the night-stool she slept and was obliged to be held. This state lasted for a fortnight, when she was seized with violent pains in the right hypogastrium, and, after some days, passed a gall-stone as large as an olive.

The symptoms which have been stated as a general principle cease on the gall-stone passing into the duodenum; but sometimes the calculus is so large as to give rise to severe disorder of the intestinal canal. A lady was attacked with symptoms of ileus, which gave rise to a suspicion of hernia, and an operation was about to be performed, when the patient most unexpectedly passed a stool in bed, which came away with a report like a pistol-shot. On examining the matters passed, a biliary calculus was discovered, $1\frac{6}{10}$ of an inch in length and $1\frac{1}{10}$ of an inch in diameter; it weighed 228 grains. The lady recovered.

Diagnosis.—The passage of the gall-stone is to be distinguished from hepatitis by the pains being in general of great intensity, and relieved by pressure, and also by the pulse continuing natural.

Prognosis.—The prognosis is always favourable, unless the calculus be of such magnitude as to render its passage almost impossible, or unless it be connected with organic disease of the liver.

Treatment.—When the symptoms of gall-stone passing the duct are present, the curative indications are to facilitate its passage into the intestine, to relieve the intense pain which accompanies it, and to prevent that inflammation which the presence of an extraneous body of any magnitude is calculated to produce in the duct.

The first thing to be done is to calm the sufferings of the patient, and a grain of solid opium, or a grain of morphine, or, what is still better, the mistura camphoræ, ʒ xj. conf. opii ʒ ſs. to ℈ ij. c. sp. æth. nitr. ʒ j. should be given every hour or every two hours till some relief is obtained, and then exhibited every four or every six hours till the pain has ceased. Should the bowels be constipated, a drachm of the sulphate of magnesia may be added to each dose, or the bowels may be emptied by an enema of warm water, salt and water, or other medicament. If the vomiting be severe, and the above medicines be rejected, the opiate should be exhibited out of an effervescing draught.

Besides these medicines, a warm bath should be immediately prepared, and the temperature should be as high as 100° to 110°, or indeed as the patient can well bear it, and the immersion should continue till he is in some degree exhausted. The intention of the bath is to relax by means of heat the muscular fibre of the ducts, and thus relieve the pain and facilitate the passage of the gall-stone. Whether this theory be correct or not is unimportant; but the effect of the bath is always so agreeable to the feelings of the patient that, on the recurrence of the pain, he constantly asks for a repetition of it, and his wishes should be complied with. If a warm bath cannot be procured, fomentations, or a large linseed poultice should be applied over the abdomen. Dry heat is always at hand, and hot flannels, hot sand, or hot camomile flowers afford some relief.

Bleeding is supposed, during the passage of a gall-stone, to be injurious; for, by debilitating the muscular fibre, it is rendered more irritable, and consequently its contraction is irregular, morbid, and prolonged. It is a rule, therefore, not to bleed until the gall-stone has passed the ducts. When that is effected, if the side be extremely tender, and apprehension be entertained that the duct may have inflamed in consequence of the irritation it has suffered, a few leeches to the side, or a few ounces of blood taken by cupping are admissible, but this practice is rarely necessary.

The calculus having passed, and the patient being relieved, the secretions of the liver should, if possible, be rendered more healthy; and a short course of neutral salts, or of the Cheltenham or Leamington waters, or small and occasional doses of blue pill or of calomel, should be recommended as a means of rendering the secretion of bile more healthy; also, if the patient be of sedentary habits, he should be induced to take more exercise. Diet also has a considerable influence on the character of the bile. Children, from their simple diet, do not appear to suffer from this disease; and a simple diet, consisting of less animal matter and of smaller quantities of fermented liquors, should be adopted. Nothing can show more strikingly the effects of diet on the bile than by stating that when animals are fed on madder the bile is of a brighter tint, or if fed on sugar, that it approximates to that of herbivorous animals.

OF THE NEUROSES OF THE ORGANS OF RESPIRATION.

The diseases of function of the respiratory organs are, spasm of the epiglottis and glottis, aphonia, spurious croup, asthma, fœtid breath, and emphysema of the lungs.

Strangulatio, or spasm of the epiglottis and glottis, is a sensation of choking, more or less violent, preventing the introduction of air into the lungs.

Remote Cause.—Whatever causes an abnormal state of the muscles of these parts is a remote cause of this affection; thus the apoplectic patient has often died when eating from the food in his mouth pressing on the epiglottis—a mode of death not uncommon in the insane. Spasm of the glottis is a frequent symptom of hysteria, as may be seen by the patient constantly grasping the throat. It also occurs in children during the period of dentition, causing cerebral croup. Every structural disease of the larynx is a cause, as may be seen by the laborious breathing of the parties affected. Sometimes it is obviously the effect of the accidental admission of a particle of salt or of grease into the larynx, or other foreign body, as a bead or bean, a pebble or a shell, a fish bone, a button mould, a portion of a nut-shell, the stones of fruit, &c. The phenomena produced by these latter causes are so remarkable that we shall shortly trace them.

Pathology.—When a patient has fallen after a foreign body has passed into the trachea, the phenomena vary in some degree according to the size of the object and the duration of the disease. If the patient has fallen within a few days after the accident, the body, if small, is usually found in the ventricles, gripped by the chordæ vocales; and besides this little else is to be seen except a quantity of mucus and a slight redness of the bronchial membrane. In cases of longer duration, and especially when the body is large, it has in general been found in the right bronchus, for a line let fall perpendicularly from the centre of the larynx falls into that tube. In addition to this, more or less of inflammation has been found, sometimes ulceration, by means of which the foreign substance has occasionally made its way into the lung, and the patient has died of pneumonic abscess.

Symptoms.—The introduction of the foreign body into the larynx is always the result of accident, the substance being carried forward to the glottis by the act of laughing or crying, or else by the current of air in a strong inspiration. The first symptoms are an instantaneous sense of suffocation, the person or child becoming black in the face, and this is accompanied by a violent cough. This lasts till the patient is entirely exhausted by the effort of the lung to rid itself of this foreign substance. A calm of necessity follows, and the substance falls down into the bronchi, where it remains quiescent till the sensibility of the parts again accumulates and a fresh effort is made to throw off the offending cause, an effort so convulsive that it is difficult to conceive without witnessing it. It is singular how long an interval will sometimes take place between the paroxysms. In a recent case the little patient appeared quite well, played about, eat heartily, and slept soundly for a whole fortnight, when the fatal attack fixed the substance (a shell) in the ventricles, and carried him off. The fatal period, however, is often much longer delayed. Mr. Liston removed a fragment of a bone six months after it had been swallowed; while

Mr. Sere speaks of a girl who coughed up the rump-bone of a chicken seventeen years after its introduction. Besides the severity of the paroxysm there is little else to denote this accident. In a late case (Mr. Brunel's) the stethescope gave no indication; and it will be plain, if the substance be of such magnitude as entirely to stop up the bronchus, air will be retained in the lungs, while, if it be smaller, air will still pass upwards and downwards, so that the lung will still give a healthy sound on percussion.

Diagnosis.—The difficulty of forming a diagnosis has already been stated.

Prognosis.—The danger in these cases is very great, from the fatal consequences which may follow a sudden return of the paroxysm. In a few cases only is the patient saved by coughing up the foreign body.

Treatment.—The treatment is by emetics, or substances that occasion violent sneezing, in hopes that the efforts thus occasioned may cause the expulsion of the foreign body. If this, however, should not take place after once or twice exhibiting these substances, tracheotomy should be performed, for, supposing the diagnosis to be erroneous, the operation is trifling and void of danger, while, if the foreign body be present, it is in general easily extracted; or should any difficulty occur in its removal, the case of Mr. Brunel shows that it may escape by its own gravity, by fixing the patient to a board and holding him up with his head downwards.

Spasmodic Croup.—*False croup* is a spasmodic affection of the larynx and glottis, by which a sudden hoarseness and difficulty of breathing, resembling the most aggravated symptoms of inflammatory croup, is produced. This disease, however, seldom lasts more than a few hours, when it subsides.

Remote Cause.—This affection rarely occurs except in children, and generally only after exposure to a cold easterly wind, or else after eating a very large, heavy, indigestible meal.

Predisposing Causes.—Every recorded fact seems to show this disease to be extremely rare, except in children under six years of age.

Pathology.—This disease seldom proves fatal, and the sudden subsidence of its formidable symptoms demonstrate it to be merely a disease of function.

Symptoms.—The symptoms are, that the child is on a sudden seized with a hoarse, crowing, sibilous breathing, loudest on inspiration, when his face becomes full and red or purple. The great distress of the child is manifest, but the pulse is quiet, and when proper remedies are applied it generally subsides in a few hours. The ratio symptomatum, when the disease occurs from indigestion, is, that the stomach being overloaded, the irritation of the gastric branch of the eighth pair is propagated to the laryngeal and pulmonary branches, and causes the difficulty of breathing.

Diagnosis.—Spasmodic croup may be distinguished from inflammatory croup by the suddenness of the attack, the quietness of the pulse, and the temporary duration of the disease.

Prognosis is always favourable.

Treatment.—In those cases in which the disease arises from sympathy with the stomach, an emetic is the best remedy; a drachm, therefore, of antimonial or of ipecacuan wine should be exhibited every quarter of an hour till vomiting is produced. As soon as the stomach is emptied the spasmodic breathing is relieved, and the paroxysm gradually subsides. The further treatment is to purge the child and put it on a light diet for a few days. When it results from a cold wind, the warm bath and free purging in general speedily restore the little patient.

Aphonia is when the larynx is so affected that the voice is wholly or partially lost, so that the patient is unable to speak except in a whisper.

Remote Causes.—The remote cause of primary aphonia is whatever affects the muscles of the larynx, as any overstraining of the voice in singing or speaking; cold or sudden changes of the weather; rheumatic affection of those parts is also a cause, as likewise all that impairs the nervous energy of the laryngeal muscles. Thus the voice is often lost after a paroxysm of hysteria or a severe mental affection. It is well known, also, that at the period of menstruation public singers lose two or more of their upper notes.

Predisposing Causes.—Complete aphonia is common to all ages, but is most common in early adult age, and more particularly in the female. In advanced age the change of the voice, and the general impairment of its tone and volume, is well known. Many singers who have compassed two octaves in their prime hardly perhaps preserve four feeble notes in old age; but this, perhaps, among other changes, may be owing to ossification of the cartilages.

Pathology.—An entire loss of the voice often takes place without any congestion, inflammation, or other structural lesion of the tissues of the larynx and glottis, and is therefore essentially a functional disease. When aphonia is secondary or symptomatic, tubercular or other structural diseases of the lungs are often found.

Symptoms.—In primary aphonia there is no tenderness or soreness of the larynx, no pain on pressure, and no expectoration, and the general health of the patient is good. It often comes on suddenly, and only in a few instances is the attack gradual. It often also disappears in a few hours, but in other cases it continues for some weeks and even months.

Diagnosis.—Aphonia is so marked a symptom, that though some doubt may exist as to the cause, none can exist as to the disease. It is distinguished from the aphonia in phthisis by the general good health of the patient.

Prognosis.—Primary aphonia is seldom of any moment. When it results from phthisis it is one of the fatal symptoms.

Treatment.—Primary aphonia, though a disease of little consequence, is often very difficult to cure. Sometimes attention to the general health will remove it. In other cases it yields to some local application, as blisters, mustard poultices, or the linimentum camphoræ, or other stimulating application. Dr. Elliotson sums up what can be done in these cases as follows,—"I do not know any better mode of treatment than the shower bath and attention to the improvement of the general health in every way you can." It should be remembered that this disease can be easily feigned.

The functional diseases of the lungs are asthma, fœtid breath, and emphysema.

Asthma.—Asthma is a laborious wheezing respiration, for the most part occurring in paroxysms, or, if constant, having exacerbations and remissions. 5183 persons are said to have died of this complaint in 1839 in England and Wales.

Remote Causes.—Whatever irritates the muscular fibre of the bronchial tubes, or impairs their nervous energy, or affects the secretions of the bronchial membrane, may be a cause of asthma. Every act of intemperance, either from accelerating the circulation, or from the sympathy which exists between the gastric and pulmonary branches of the eighth pair, is a cause. Every mental affection, also, either from acting on the heart, or from its exhausting the system generally, and consequently the lung of its nervous energy, is also a cause. Laënnec speaks of a man who, probably from apprehension of an attack, could not ride across a plain. Temperature or weather has also a great influence in the production of this disease. Floyer says, a change from frost to thaw often caused him a paroxysm; also a change of wind from west to east. Rain, or snow, or fog, often had the same effect; and "I feel them," he adds, "even before they come on." He states, also, that he suffered sixteen attacks in winter and twenty in summer, but that the most violent paroxysms were in August. Van Helmont says, he has also observed asthma to be more frequent and more severe in summer than in winter, but adds, "I have likewise seen asthmatic patients who suffer more in winter than in summer." Indeed the asthmatic patient may be said to be—

> "But now of turbid elements the sport,
> From clear to cloudy toss'd, from hot to cold,
> And dry to moist, with inward-eating change,
> Our drooping days are dwindled down to nought—
> Their period finish'd ere 'tis well begun."

Sometimes asthma arises from inexplicable conditions of the air: thus, most people are better in the country; but some can only live in London in the narrowest and darkest streets; others are well in low and damp situations, surrounded by the smoke of steam-engines and the effluvia of lime-kilns; while others can only breathe on a high, open, and dry position. Again, asthma is often caused by some specific irritating cause. At St. Thomas's Hospital, the laboratory man cannot pound ipecacuanha without being seized with a fit of asthma which lasts him many days; while the smoke of tobacco, or the emanations from grass in flower, producing what is termed hay-fever, or hay-asthma, are causes of it in others. The impalpable dust inhaled by bakers, miners, leather-dressers, china manufacturers, or needle grinders, is often a cause. Every structural disease of the lung is also a cause, and asthma is consequently an occasional accompaniment of phthisis.

Predisposing Causes.—This disease sometimes occurs in children under ten years of age, but these cases are extremely rare. It is not unusual between twenty and thirty, but is most common after fifty. Women in this country suffer in a less proportion than men, 3092 having fallen of the latter to 2091 of the former. Frank, however, says in his experience, that males suffered more than the females in the ratio of six to one. In young women the attack is most severe about a week preceding menstruation. The aged, indeed, of either sex, are seldom altogether free from it, and this appears to be chiefly owing to the physiological changes which take place at this period of life, the tissue of the lung becoming more rare, its cells larger, and its capillary blood-vessels obliterated; while the innervation of the eighth pair is very generally impaired, and thus the foundation of the disease is laid in organic alterations. Asthma appears in many instances to be hereditary, and to descend through two or three generations.

Pathology.—In proof that this affection is merely a disease of function, the bodies of many persons have been examined without the lungs being in any sensible degree diseased. Persons, however, affected with this complaint have in general very delicate lungs, and suffer much from bronchial inflammation, and the mucous membranes are consequently often congested. The cough is also often of unusual violence in this disease, and the lungs are therefore sometimes found emphysematous. In the aged, asthma is very constantly combined with disease of the large arteries, and more especially with disease of the left side of the heart, and in this latter case the asthma in all probability arises from the sympathy which exists between the cardiac and pulmonary branches of the eighth pair.

Symptoms.—Asthma has been divided into three kinds, or into dry asthma, humoral asthma, and purulent asthma; but these different forms of disease run very constantly one into the other. In general it is paroxysmal, but sometimes it is continued.

The dry asthma is a continued difficulty of breathing, with a loud wheezing respiration, increased by every attempt at bodily exertion, but without any affection of the mucous membrane of the lungs. This disease is common to old people, especially those whose heart and arteries are affected; and the difficulty they experience in walking or in ascending a flight of stairs, "for want of breath," is well known. More commonly, however, the mucous membrane is affected in asthma either with an abundant serous expectoration, or else with a more or less copious secretion of pus; but in either case the peculiar symptoms of asthma are not changed. Floyer, who laboured under this disease for thirty years, thus describes his sufferings during the paroxysm.

"For some hours preceding the fit of asthma, the patient experiences a sense of straitness, a fulness about the pit of the stomach, and is much troubled with flatulency; at the same time there is a heaviness of the head, drowsiness, propensity to yawning, and a discharge of pale urine. If these symptoms come on towards the afternoon they are followed at night by a tightness straight across the chest, and oppression of the breath and some wheezing. There is generally, too, convulsive cough, with little or no expectoration. In the course of the night the symptoms become more urgent, the inspirations are made with the utmost labour, the chest and shoulders being lifted up with great violence, and in a convulsive manner. In this distressing state the patient is often necessitated to get out of bed and to remain in an upright posture. Although the expirations are not so difficult as the inspirations, yet they are performed very slowly and with a wheezing noise. In this stage of the fit a person can neither speak nor cough. His face appears pale or livid, his hands and feet are cold, and his pulse is generally weak and irregular. He has a great desire for fresh air, and is much oppressed by a close heated room, by dust, smoke, or bad smells, and even by the weight of the clothes upon his chest. After some continuance of the attack headache is superadded to the other symptoms, and, the pulse becoming somewhat accelerated, there is a slight degree of feverishness. As the fit declines there is a discharge of wind both upwards and downwards, and frequently a motion to stool; the expectoration, also, at first, perhaps, difficult, becomes freer, and the urine, which before the fit was pale, is now high coloured, and deposits a sediment,"—a change which seems to imply that asthma is a constitutional rather than a local disease. Such are some of the most prominent symptoms

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of a paroxysm of asthma, which is more or less frequently repeated. In the worst cases a painful and most distressing angina pectoris aggravates the sufferings and increases the danger of the patient.

On inspecting the chest of a patient labouring under a severe paroxysm of asthma, the whole upper part seems almost motionless, while the inferior portions are acting within a very confined range. The abdominal muscles, however, act most powerfully. The stethescope teaches us that the whole of the lungs, but particularly the posterior lungs, are labouring with a loud and deep sibilous sonorous wheeze, accompanied with a mucous rattle, sometimes loudest on inspiration and sometimes on expiration. Percussion shows the lung is distended with air; and should an air-cell have burst, a rubbing sound will be heard, denoting the effusion of air into the cellular substance of the lung. As the fit subsides the respiration becomes puerile, and by degrees the breathing returns to its usual state. In fatal cases the respiration becomes tracheal, slight hæmorrhage perhaps takes place, and after a severe struggle the patient falls.

The duration of the fit is very various, for in some cases it lasts a few minutes, in others two or three hours, in others the whole night, in others three or four days, and in others as many weeks.

The frequency of the recurrence of the fit is equally various; sometimes it occurs every night, sometimes every few nights, and at any longer period. The late Dr. Heberden remarked that some asthmatics experience four attacks in the year, others only two, or in spring and autumn, and others again only one attack in the year, and that in winter.

Diagnosis.—The disease with which asthma is most likely to be confounded is a sudden effusion of water into the chest, from which the dulness, on percussion, together with the ægophony, readily distinguish it.

Prognosis.—The prognosis of any given paroxysm is always favourable. Many persons attain old age though suffering many years from asthma. There can be no doubt, however, of its acting unfavourably on the general health, and that it tends to shorten life and predisposes many to apoplexy. When it occurs in early life the patient often gets rid of it.

Treatment.—The treatment comprises what should be done during the fit and what should be done to prevent its recurrence.

The dry asthma is seldom severe, or else sympathetic and connected with disease of the heart. In the first case slight opiates and expectorants are sufficient. In the last, relief must depend on the success which attends the treatment of the primary disease.

When the patient is labouring under a fit of either of the other forms of asthma, our efforts must be directed to tranquillize his suffering and to shorten the attack; but so capricious is this disease, that what will benefit the patient in one attack will be of little use in another. As a general rule, however, the patient should be supported, and mist. camphoræ, ℥ iss., sp. ætheris nitr., ʒj., c. confect. opiatæ, ʒ ss., given every hour, or every two hours, for a short time, are among the best remedies. If the head should be affected by the opium, some milder narcotic should be substituted, as tinct. hyoscyami, ♏ xv. or syrupi papaveris, ʒj., which latter agrees with everybody. In other cases, or in other attacks, assafœtida, castor, musk, or hydrocyanic acid, ♏ iij. 6^{tis} may be substituted. Again, if the fit should occur after a hearty meal, some purgative should be given to empty the stomach, or the tinct. rhei, or the sulphate of magnesia in ʒj. doses. If the attack be long, arrow root or sago, with small quantities of wine or brandy, should be given to support the patient under this laborious and exhausting attack.

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With respect to emetics, the exhaustion they produce is seldom compensated by any long-continued alleviation. Expectorants for a time perhaps relieve the patient, but long continued they impair digestion, create flatulency, and are at length abandoned.

The feelings of the patient should be consulted as to the temperature to which he should be exposed during the paroxysm. In general, where there is organic lesion of the heart and large vessels, the fresh air is extremely grateful and reviving, its coldness giving power to the circulating organs, and by lowering the temperature of the body enables the patient to live on a smaller quantity of oxygen. It is on this principle that the dog asphyxiated by the effluvium of the Grotto del Cane is thrown into the water, he being able to breathe at the temperature of the water when he would have died at the temperature of the atmosphere. The toad, also, when cooled down, will live encased in plaster of Paris, but if his body has a high temperature the experiment is fatal. On the contrary, when the disease is purely pulmonary, warmth, by relaxing the spasm of the bronchial vessels, is generally more useful than cold. It is singular, also, that experiment has shown that animals can live for a short time at a high temperature on a smaller quantity of oxygen than usual,—the rarefaction of the air hardly allowing the arterial blood to undergo any change in the capillary system.

The treatment during the interval must depend very much on the age and pathological state of the patient. In young persons, whose constitution is sound and habits temperate, much benefit will be found from warm tonics and attention to the general health; while in humoral asthma small doses of mercury, or squills, or the tinct. lobelia inflata, are supposed greatly to assist the patient; and in disease of the heart, camphor mixture, sp. ætheris nitrici, and small doses of digitalis are proper. There are a certain class of cases, also, though not accurately determined, which are much benefited by quina.

The inhaling of oxygen, hydrogen, and hydro-carbonated gases has been tried, but with little benefit; and so also of the smoke of stramonium, or other narcotic drug. Blisters are often useful both during the paroxysm and in the interval.

The diet of the patient should be light; he should also wear flannel, and guard himself from cold and wet, especially in his feet. When the disease is prolonged, change of air ought always to be had recourse to.

Emphysema of the Lung.—Emphysema of the lung is the extravasation of air into the cellular tissue of the lung, either in consequence of a secretion, or of the rupture of an air-cell. Dr. Baillie has described this disease, and Laënnec has connected it with its symptoms.

Remote Cause.—The cause of emphysema is often mechanical, and probably arises from the glottis becoming so strongly contracted in a fit of severe coughing, that the muscles of expiration are unable to overcome this obstacle, and consequently some of the air-cells give way, and the air escapes into the cellular tissue of the lung. In other cases it is a primary disease, the air being perhaps secreted into the cellular tissue in the agony of death. The remote causes of emphysema, therefore, are also those causes which produce cough, and the debility of the last agony of life.

Predisposing Causes.—This disease is occasionally met with in children labouring under hooping-cough, but is most common in middle and advanced age.

Pathology.—In emphysema of the lung, the size of the cells is increased and their form rendered irregular by the extravasation of air. The magnitude of these cells varies greatly, or from a millet-seed to an egg, the larger sized ones being formed by the rupture and communication of one or more cells. The rupture of the cells often detaches the pleura, and permits it to rise above the level of the lung to a considerable extent, so that the affected part has some resemblance to a bunch of currants or of grapes, and that portion of the lung does not collapse, but rather protrudes on opening the chest. In some instances the air escapes through the bronchi on pressure, but more commonly no such effect takes place, showing that the air has been secreted and not extravasated by rupture of an air-cell. Emphysema is found combined with many inflammatory affections of the lungs.

Symptoms.—This disease, it has been stated, occurs only with severe cough, and, strange to say, after its occurrence the cough seems hardly aggravated. It is only determined to be present by auscultation, when it is denoted by a rubbing sound as the lung ascends or descends. Laënnec also adds, a " râle crépitant sec à grosses bulles." These are the symptoms.

Diagnosis.—In pleurisy there is also a rubbing sound. It is distinguished from this disease by the absence of pain.

Prognosis.—Laënnec conceives this disease to be much less grave than might be supposed, for he affirms the air may be absorbed, and the cells heal, leaving a cicatrix. He thinks he has seen many recover, and many certainly do recover after the rubbing sound is present.

Treatment.—When it does yield it is to the general treatment of the cough.

Of Fœtid Breath.

Remote Cause.—A disagreeable taint of the breath often occurs in ill health of whatever nature, but it also sometimes occurs in the best health, and without any assignable cause.

Predisposing Causes.—This affection often attacks children and adult persons of every age and of both sexes.

Pathology.—Andral gives a case of a person who suffered from an extremely offensive breath, and whose body he examined, but without discovering any organic lesion of any kind. This affection is therefore entirely a disease of function. The lungs, indeed, are one of the means by which many substances which mingle with the blood are removed from the body. If a person eat onions, it is not solely because they are in the stomach that the breath smells of them, but because the odorous principle is absorbed and mingles with the blood, and is removed by the lungs. It is the same with alcohol, which is equally given off by the lungs. Again, if phosphorus be injected into the veins, and the animal be placed in the dark, it seems to breathe flames of fire. The lung, therefore, is a secreting organ, and those secretions, like those of other parts of the body, may become diseased and give rise to fœtid breath.

Symptoms.—The symptoms are too marked to need any description. The degree, however, to which the breath may become tainted is quite remarkable, for in some cases it is so putrid as to resemble the odour of gangrene. A man in St. Thomas's Hospital, though otherwise in good health, laboured under this disease to such an extent, that, although he was surrounded with chlorides and aromatics, it was impossible to go near him. A very interesting young lady, who likewise suffered from epilepsy, had so intolerably a fœtid breath that nobody but her own mother could be found to enter her room or to nurse her.

Diagnosis.—It is distinguished from gangrene of the lung by the health not being in any corresponding degree impaired.

Prognosis.—This affection, except in extreme cases, is rarely grave. When the fœtor, however, is intolerable, it is often the forerunner of severe disease, and ends fatally.

Treatment.—In slight cases, gentle purgatives and attention to the general health are sufficient to remove this affection, but for the severe cases that have been mentioned no remedy has been discovered. Surrounding the patients with the chlorides, and with boiling vinegar mixed with aromatics, is some relief to the attendants, but in no degree influences the disease itself.

Of the Neuroses of the Heart.

The neuroses of the heart are angina pectoris and palpitation.

Angina Pectoris is an extremely agonizing pain of the anterior portion of the chest and neck, extending to the shoulder and down the arm.

This disease had attracted little attention, till Dr. Heberden, about seventy years ago, 1772, drew the attention of the profession to it by two papers published in the second and third volumes of the *Transactions of the London College of Physicians.* He connected it with disease of the heart, and it has ever since been treated of in conjunction with the disease of this organ. It has subsequently been studied by Drs. Black, Parry, and Jenner, and by many continental physicians.

Remote Cause.—Every severe functional or structural affection of the heart or lungs lays the foundation of this complaint, and the foundation once established, every atmospheric vicissitude, error in diet, or moral or physical exertion, will bring it on. Mr. Hunter, who suffered greatly from this disease, used to affirm that his life was in the hands of any person or circumstance which acted powerfully on his mind, and, in fact, he ultimately died from strong but suppressed feelings on a point in which he was interested. Ascending a staircase or other acclivity, or indeed any active exertion, is a powerful exciting cause.

Predisposing Causes.—Age has a powerful influence in the production of this disease, for it rarely attacks children unless affected with rheumatism or other disease of the heart. It is not uncommon, however, in early adult age in the paroxysm of hysteria. The aged, however, suffer the most, for out of eighty-four cases noted by Dr. Forbes seventy-two were above fifty and twelve only under fifty. Males have been observed to labour under this affection more frequently than females, or of eighty-eight cases eighty were males.*

Pathology.—Angina pectoris being present in many cases of hysteria and of simple palpitation of the heart, and also of idiopathic asthma, it is plainly often a

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* *Encyclopædia of Practical Medicine,* Art. 'Angina Pectoris.

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merely functional disease. It exists, however, with most of the organic diseases of the chest, and Dr. Forbes finds in different authors from the time of Heberden the following results, from the examination of forty-five bodies of persons who had suffered from this affection. Of this number there was obesity in four, but no disease; organic disease of the liver existed in two, while organic disease of the heart or larger arteries existed in thirty-nine.

Symptoms.—The attack of this disease is generally sudden, and is characterized by a constrictive anxious pain, fixed most commonly on the left lower half of the sternum, and rarely extending above the fourth rib. Occasionally, however, and especially in rheumatism, it extends over the whole anterior portions of the chest, along the neck to the lower jaw, into the back and shoulder, down the arm to the elbow, and even to the hand and fingers—a course which shows it to affect externally the superficial cervical plexus and its ramifications, as well as the anterior thoracic nerves, the cubital nerve, and its divisions. The pain is also sometimes sub-sternal, and then follows a course which shows that the nervous plexus placed between the folds of the mediastinum, and also the branches of the eighth pair, which go to the large arteries and surround the bronchial tubes, are affected, explaining the cause why the pulse is sometimes rapid, sometimes hardly to be felt; also why the breathing is greatly accelerated, or else imperceptible. Mr. Hunter, when labouring under the paroxysm, could scarcely feel his pulse, and thought he should die unless he exerted his voluntary muscles to carry on respiration, and many have died literally asphyxiated. Darwin has also seen the action of the diaphragm, and consequently the phrenic nerves affected, while Laënnec mentions that the lumbar and sacral nerves also partake of the same disease, which in some measure explains the fact of the urine being sometimes suppressed during the paroxysm. Besides the parts which have been mentioned, the gastric system is also much affected, the patient perhaps being in an instant distended with wind, and only relieved by repeated eructation. In all cases, where the patient is not broken down by disease, the mind is clear, but the face and extremities are cold and pale. At length the paroxysm subsides gradually, when much wind is discharged, accompanied by a copious and almost involuntary flow of pale limpid urine, and the patient recovers.

The time of the attack is extremely uncertain; in asthmatic cases it is often about two o'clock in the morning; while in other cases it occurs at any period of the day or night.

The duration of the fit is very various, for sometimes the pain only lasts a few minutes, while at other times it will continue for two or three hours, a whole day, or even longer. The interval is likewise very uncertain, or from a few hours to a few days, or a few months. Each repetition, however, increases the tendency of the paroxysm to return, and also its violence; and at length, perhaps, an aggravated attack occurs, and puts a period to the patient's existence.

Diagnosis.—The diagnosis of this disease is palpable.

Prognosis.—Angina pectoris, when a primary disease, or the result of hysteria, &c., is rarely fatal. When it is a secondary affection, the danger is in proportion to the nature and degree of the organic lesion on which it depends. If the lesion be of a dangerous character, the angina denotes a paroxysm of unusual severity, and is always a symptom of danger. Dr. Forbes says, of sixty-four recorded cases of angina, forty-nine died, and almost all of them suddenly.

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Treatment.—The indication for the treatment of angina pectoris is to support the patient by mild stimuli, as æther, camphor, and by moderate doses of opiates, assisted by a small quantity of wine or brandy and water. If the attack has been preceded by a hearty dinner, some warm purgative, as the decoct. aloës comp., or perhaps an emetic should be exhibited. The paroxysm past, we must look to amend the general health of the patient. The organic affections, however, are generally of an irremediable nature.

During the paroxysm the patient will find a recumbent posture, fresh air, and perfect quiet, greatly contribute to restore him. Dr. Forbes gives a case in which the party was seized on horseback, when, continuing his course, he fell dead off his horse.

Of Irregularities of the Heart's Action.

The heart may beat abnormally slow, may intermit, may have a rolling action, or its pulsations may be so frequent, and its action so irregular, as to be termed *palpitation*. These states are all caused by an irregular innervation of the heart, by which it is rendered morbidly sensible or insensible to its natural stimulus, the blood. The excessively slow pulse is often caused by some pressure made high up in the cervical portion of the spinal cord, or else by congestion or pressure on the brain. The other states are perhaps inexplicable, and may be considered as ultimate facts. The irregular and rolling action of the heart is, in general, accompanied with hypertrophy, or other disease of that organ, and will be best treated of under those heads of disease. Fits of palpitation, however, may occur in the most healthy subjects, and in the most healthy hearts, and this neurosis of the heart is the only one of which we shall now treat.

Palpitatio is an abnormal innervation of the heart, by which its actions are rendered often highly irregular, and its pulsations remarkably increased in frequency.

Remote Cause.—The excitability of the hearts of young people is readily accumulated and as readily exhausted. Everybody is aware how powerfully every passion and every affection acts on the heart and changes its healthy beat; as also how every error in diet, or any overexertion, may produce the same effect. Every moral, as well as almost every physical cause, may consequently be the remote agent in the production of palpitation, while every pathological state of the heart may be accompanied by it.

Predisposing Causes.—This affection of the heart, as a primary disease, seldom occurs before puberty, but after that period it is common, and often to a most distressing degree in both sexes. The female, however, suffers more than the male, and especially during amenorrhœa, or at the period of menstruation, and in more advanced life when menstruation ceases.

Pathology.—That palpitation is merely a disease of the function of the heart, is evident from the number of young persons who suffer from it, and who afterwards attain a hale old age. Laënnec says it is generally believed that habitual palpitation of the heart at length terminates in hypertrophy or dilatation of that organ; but he adds, "I have seen nothing to establish this fact." Palpitation, however, is a symptom of every disease of the heart, and consequently every diseased state of the heart is found concomitant with this affection.

Symptoms.—The attack of palpitation may be sudden, or it may be preceded by acidity, flatulence, or other affection of the stomach. It has many degrees. In young persons of a delicate constitution it often occurs in a slight degree nightly; so that the patient, on going to bed, passes many hours sleeplessly, not only feeling his heart beat but also hearing it. His subsequent sleep is unrefreshing, and he awakes in the morning more tired and jaded than when he went to bed.

In some cases, as in young women labouring under leucorrhœa, the palpitation is constant, the pulse beating for many weeks at 150 to 180 strokes in a minute. In other cases it is paroxysmal. When the paroxysm is formed, the pulse may still preserve a regular rythm, only greatly increased in frequency, while its force may be increased or diminished. In the severest cases, however, the pulse is so rapid that it has a mere vibratory motion, and cannot be counted, while its rythm is extremely irregular. The force of the heart's action also is now excessive, and now not to be felt. In general the contraction of the ventricles is so rapid that it is impossible to hear the sound of the auricles; and again, so singularly irregular is the action of the heart, that the auricles may contract at the same time as the ventricles, or perhaps contract three or four times for the ventricles' once; and indeed the heart appears to act with every possible degree of irregularity. In general the other branches of the eighth pair are affected besides the cardiac branch, for the patient often becomes distressingly distended with flatus, and that almost on the instant, while his deep sighing shows the pulmonary as well as the gastric branch to be involved. The patient having lain in this state, pale, anxious, and restless for a greater or less length of time, the fit at length terminates, and the pulse perhaps is restored to its natural frequency and healthy rythm as instantaneously as it had lost them. The patient now passes a considerable quantity of pale limpid urine, and, though feeble from exhaustion, is once more able to sit up and so far to exert himself.

The duration of the paroxysm is very various; sometimes it lasts a few minutes, sometimes a few hours, while Laënnec speaks of a paroxysm connected with organic disease which lasted a week. The interval between the paroxysm is also uncertain. In young persons it may occur every twenty-four hours two or three times a week, or every month; or a still longer period may elapse.

Diagnosis.—The fact of palpitation cannot be mistaken.

Prognosis.—Palpitation is seldom dangerous, unless conjoined with organic disease of the heart, and when merely an idiopathic disease, it frequently subsides as the patient advances in life.

Treatment.—During the paroxysm the patient should lie flat on his back, bare his neck and chest, and allow the air to blow freely over him. The best remedies are camphor mixture and æther ʒi., with some slight opiate, as the syrup of poppies ʒj., or else tinct. hyoscyami ♏xx.; and this should be repeated every quarter, or every half hour, or hour, according to the severity of the attack, till the heart's action is stopped. Cold brandy and water, as it is always at hand, is an excellent substitute for, or adjuvant to, that medicine. Again, if the attack occurs shortly after a meal, some purgative medicine should be given to clear the stomach.

The paroxysm past, the patient, though much exhausted, speedily recovers his usual health, which is generally feeble. It is useful, however, to continue the medicines which have been mentioned, but at longer intervals, for some time. It is important in these cases, however, to counsel the patient strictly as to diet, for without such auxiliary assistance medicine is often of little service. On questioning these patients, we constantly find that the palpitation returns after tea or after breakfast, or whenever hot tea or hot coffee has been drank, and in these cases it is extremely desirable to wean the patient from all hot slops, and to induce him to drink cold water at his breakfast and indeed at every meal; his wine also should be limited to two or three glasses of sound sherry, and should be drank diluted with water. There are few tonics so beneficial as the natural tonic of cold water, and persons once accustomed to it feel a return to a modern breakfast as a punishment rather than a gratification.

Of the Neurosis of the Urinary Organs.

The kidneys are the organs by which ten-elevenths of all the azote introduced into the system, as aliment, is discharged. They are also the means by which a large portion of the fluids, all the phosphates, as well as many extraneous substances received into the circulating system, as turpentine, copaiba, myrrh, iodine, rhubarb, the odoriferous particles of asparagus or of buchu, are removed from the body. In health, the specific gravity of the urine varies from 1015 to 1025, and the following substances, according to Berzelius, are found in it:—

Water	933·00
Urea	30·10
Uric acid	1·00
Mucus	·32
Lactic acid, free lactate of ammonia, animal matters soluble in alcohol	17·14
Sulphate of potash	3·71
Sulphate of soda	3·16
Phosphate of soda	2·94
Phosphate of ammonia	1·65
Muriate of soda	4·45
Muriate of ammonia	1·50
Earthy matters	1·00
Silex	0·03
	1000

Such is a general view of the composition of human urine in its healthy state. But this fluid is subject to a great variety of morbid conditions. Its quantity may be greatly diminished or increased, or it may be suppressed altogether. The usual salts, as the urea, the urates, and the phosphates, may be in great excess, and hence lay the foundation of those distressing complaints, stone and gravel; or they may be in great defect, as in most nervous disorders. Besides these alterations in the proportions of its healthy constituents, urine may contain many morbid secretions, and, strange to say, this acrid fluid is sometimes sweet, containing a considerable portion of sugar, causing the disease termed diabetes mellitus. The other morbid secretions of the urine are oxalic acid, giving rise to the mulberry or oxalate of lime calculus, and those substances termed cystic oxyde and xanthic oxyde. Albumen also very commonly exists in large quantities in the urine; but this latter disease, when of any extent, is so constantly accompanied by disease of the kidney and by dropsy that we shall treat of this particular affection under the head of dropsy.

The average quantity of urine discharged daily in health is estimated to be about thirty-five ounces. When this quantity is greatly in defect the disease is termed anuria; when in great excess it is termed diabetes insipidus.

Anuria; ischuria renalis is a complete or partial suspension of the functions of the kidney, by which the quantity of urine is greatly in defect, or its secretion entirely suppressed. One hundred and sixteen cases are said to have died of this affection in England and Wales in 1839.

Remote Causes.—This affection may be caused by disease of the kidney itself, or it may be secondary, and arise from disease in other parts of the body. Among the latter are injuries of the head or spine, an affection of the brain in fever, an attack of pneumonia, when the patient will sometimes hardly pass a few ounces of urine in twenty-four hours, or of hysteria, when it is often suppressed for several days together, and also of inflammation or high irritation of the bladder. When the disease is idiopathic it may depend on inflammation of the kidney, caused perhaps by some poison acting on that organ, as that of small-pox, or else by cantharides, or turpentine. Anuria is also caused by those many undefined conditions of the kidney which produce dropsy. The presence of a calculus also in the kidney or the ureter is also an occasional remote cause.

Predisposing Causes.—All ages are liable to this affection; children from teething often suffer a complete suppression, or only pass a few drops of fiery urine in the twenty-four hours; the adult from gravel or stone; and the aged from disease of the brain or cord. Both sexes equally suffer from it, and especially when labouring under dropsy.

Symptoms.—The existence of complete anuria is palpable, the patient passing no urine; and, again, if the catheter be introduced, no urine flows through it. When the suppression of urine is merely symptomatic the symptoms are little marked, being lost in the greater disease. The patient, however, may complain of some pain in the back, of some irritability of the bladder; he then becomes anxious and restless, till at last the brain is oppressed, and he dies comatose. In other cases there is nausea, hiccough, and the body exhales an urinous odour. When the suppression is less complete, and depends on an affection of the bladder, the local sufferings of the patient, the forcing of the bladder, the tenesmus, and the general irritation of the poor sufferer are most severe and distressing.

The time during which the urine may be suppressed, and yet the patient recover, is very various. Children when teething often void only a few drops of urine, and that at several hours' interval. The urine passed at such times is extremely high-coloured, stains the linen, and is passed with great pain, the child crying bitterly as it scalds the surface over which it flows. In hysteria the urine is often suppressed for three or four days. Dr. Laing, of Fochabers (*Edin. Med. and Surg. Jour.*, vol. x.), gives a case in which no urine was secreted for nine or ten days, and yet the patient did well. As extreme cases, Dr. Parr, in his *Medical Dictionary*, mentions a patient who made no water for twenty-two weeks, while Dr. Richardson speaks of another who up to seventeen years of age had never passed a drop of water in his life. In this case the ureters must, as in birds, have terminated in the large intestine, and the urine have been passed with the fæces. In general, however, it may be laid down as a maxim, that when suppression of urine depends on any acute or severe disease the patient seldom survives this symptom more than three or four days.

Among the symptoms mentioned by authors of the suppression of urine is an urinous odour of the perspiration from the axilla and umbilicus, and they have accounted for it by supposing the urine to be first secreted and then absorbed. Much doubt hangs over these cases, for the suppression perhaps is not complete—a few drops wet the bed, the hand becomes impregnated, and an urinous smell is thus imparted to distant parts of the body. It is certain also that some of these cases are feigned; some women, for instance, are said to have had a vicarious discharge of urine from the stomach, and Nysten gives the case of a girl who vomited urine, but it was at length ascertained she first swallowed it. Another girl vomited not only urine but well-formed fæces, but it was also discovered that she first swallowed them. Rayer gives a similar case of a woman at La Charité, who had an abdominal tumor, which was supposed to be connected with the kidneys. Many persons saw her vomit urine, and Guibourt detected it chemically in the matters thrown up, but, strange to say, she had first drank it, though for what motive, except notoriety, nobody could imagine.

Diagnosis.—This disease is to be distinguished from mere retention of urine in the bladder, or from ischuria vesicalis, by there being no fulness in the vesical region, and by no urine flowing when the catheter is passed.

Prognosis.—Many cases recover from a suppression of urine of not more than twenty-four to forty-eight hours, but, except in hysteria, few survive if the disease continues a longer period.

Treatment.—When anuria is idiopathic and primary the patient should be placed in a warm bath, and be purged by substances that act on the kidney, as the neutral salts. Indeed, if the case be slight, purging by any cathartic is sufficient. If this method should not succeed, ♏ x. to xxx. of the tinct. cantharides should be tried every four or six hours, according to the urgency of the case. Many physicians, however, prefer a tonic treatment, as the camphor mixture and æther, the haustus olei cum manna, or the tinct. ferri muriatis, ♏ xxv. to ♏ l.

The treatment of symptomatic anuria resolves itself entirely into that treatment which will remove the primary disease.

Diabetes Insipidus

Is a considerable excess of the urine, so that instead of thirty-five ounces it amounts to several pints in the course of the twenty-four hours. There are two forms of this disease, or Hydruria and Azoturia.

Hydruria is a copious discharge of limpid watery urine, containing the usual ingredients, but small in proportion to the quantity of urine passed, so that its specific gravity varies from spring water, or 1001 or 1002 to 1008 to 1010.

Remote Causes.—The causes of this affection are probably the usual general causes acting upon a highly nervous temperament, it having been observed principally in hypochondriacal persons of feeble constitution, and whose diet has been low, or who have been much exposed to the accidents of life.

Predisposing Causes.—Hydruria has been met with by Dr. Watson, in a boy aged thirteen, who passed nineteen pints of urine daily of the sp. gr. of 1002. It is more common, however, from twenty to forty, and again in old age, and particularly in old men.

Pathology.—In such cases as have fallen at the early periods of life, the kidneys have been found healthy. In old people it appears associated with organic disease either of the kidneys or neck of the bladder.

Symptoms.—The leading symptom, or an excess of pale urine, is palpable, and cannot be mistaken, and on examination the fluid passed is found to be either neutral or to have only a faint acid re-action. A patient aged twenty-six fell under the care of M. Peschier, who passed ten to twelve pints of urine daily, of a light citron colour, of an urinous odour, and which still reddened vegetable blues. On analysis, the quantity of urea was trifling, ninety ounces of this urine yielding only 1095 grains of solid extract, instead of 3000 grains. Dr. Storch gives a case in which eight to twelve pounds of urine were passed daily, and in which there was hardly a trace of urea or of any of the usual salts. Dr. Willis also gives the case of a boy three and a half years old, who drank about four pints in the twenty-four hours, and whose urine was as near as possible of the specific gravity of distilled water, and 100 grains evaporated left but the fraction of a grain of solid residue. The specific gravity of the urine, which in health may be taken at 1010 to 1020, sinks in this disease to 1002.

The general health of these patients is always feeble. In person they are emaciated, pale, and often complain of pain in the back.

Treatment.—The treatment of this disease is by mild opiates, tonics, and attention to the general health.

Azoturia, Diabetes Insipidus.—In this form of disease the quantity of urea which exists in healthy urine in the proportion of 30 parts to 1000, and amounting to about an ounce and a half in the twenty-four hours, is often increased five-fold, to 150 parts in 1000, or to seven ounces and a half in the twenty-four hours, while the specific gravity is raised from 1010 to 1015 in health to 1020 and even to 1030. This is a rare form of disease, and according to Dr. Prout there are twenty cases of diabetes mellitus to one case of diabetes insipidus.

The *remote* and the *predisposing causes*, and likewise the pathology, as far as the facts of the disease are at present known, are exactly the same as in hydruria. The circumstance of the kidney being found healthy in this affection is explicable on the ground that the experiments of Prevost and Dumas have rendered it probable that urea exists formed in the blood, and that the office of the kidney is to separate it from that fluid. It will be seen, however, that urea being composed of oxygen, hydrogen, carbon, and azote, elements found abundantly in the blood, that it may be a secretion, and its excess a mere functional derangement of the kidney.

Symptoms.—There are supposed to be two forms of this disease, or diabetes insipidus with diuresis and without diuresis. In the latter case the urine is of the colour of porter, small in quantity and of great specific gravity. In the former the urine is pale, greatly increased in quantity, amounting often to eight, ten, sixteen, or more pints in the twenty-four hours, has an urinous odour and an acid re-action. The mode of determining the excess of urea is by pouring a small quantity of urine into a watch-glass and treating it with nitric acid. If the salt be in great excess, crystals of nitrate of urea will be seen at the edge of the fluid in a few hours. If, however, the quantity be smaller, it may be necessary to evaporate to about one-half before crystals will form. The crystals of the nitrate of urea are four-sided prisms, are neither acid nor alkaline, and are readily soluble in their own weight of cold water, and in any quantity of boiling water. Cold alcohol dissolves twenty per cent., and boiling alcohol any quantity of this substance.

The patient suffering from that form of the disease which is accompanied by great diuresis, is usually emaciated, hollow-eyed, sallow, and worn down by the great loss of azote. His bladder is also highly irritable, from the large quantity and morbid state of the urine with which it is so constantly distended; his bowels are likewise constipated, while his skin is harsh and dry, and without perspiration. On the contrary, when the diuresis is inconsiderable, he often preserves a considerable degree of *embonpoint*.

The duration of azoturia, if left to itself, is always long and tedious, pursuing an uninterrupted course of many months or years, and often when it subsides there is a metastasis to the lungs, and the patient dies of phthisis.

Diagnosis.—This disease can only be confounded with diabetes mellitus, and is readily distinguished if the party has the courage to taste, or the ingenuity to evaporate a small portion of his urine.

Prognosis.—The prognosis is always favourable, unless there be metastasis to the lungs, and then the patient usually falls.

Treatment.—No one definite plan of treatment can be laid down for this disease, but the milder forms are benefited by mild opiates, and the severer forms by opium and the mineral acids, as the infusi rosæ c. acidi sulphurici diluti ♏ v. c. tinct. opii ♏ iij. to ♏ x. 6^{tis} vel 4^{tis} horis; preparations of iron are also useful. Dr. Prout conceives calomel, black dose, and saline purgatives are calculated to do infinite mischief.

In hydruria, the diet should be generous and the quantity of animal food increased. On the contrary, in azoturia the quantity of animal food should be diminished.

Diabetes Mellitus.

The peculiarity of this disease is that the urine is sweet, and actually contains sugar. Its quantity, also, is for the most part greatly increased, amounting to many quarts, while its specific gravity ranges from 1020° to 1050°, and even higher.

The saccharine quality of diabetic urine was first discovered by Willis, the contemporary of Sydenham, and the subject has since been chemically investigated by Cruikshanks, Rollo, Prout, Bostock, and many still more recent writers. Two hundred and fourteen cases of this disease are reported to have died in 1839 in England and Wales.

Remote Causes.—The remote causes of this disease are extremely obscure; it has been attributed to wet, to cold, and to excess in sexual pleasures, to malaria, to mercury; these, however, are insufficient, unless a strong idiopathic disposition exists.

Predisposing Causes.—Diabetes mellitus has rarely been seen in persons under twenty. Both sexes are liable to it, but men are more commonly affected than women; thus of those that fell from this disease in 1839, 151 were men, 63 women. The parties whom diabetes mellitus attacks are generally thin and emaciated, but occasionally full and plethoric. Dr. Prout mentions one gentleman that weighed twenty-three stone, and another who weighed seventeen stone. It has been observed in some instances to be hereditary, and in others to run in families. One German writer says he has seen seven cases in one family.

Pathology.—The kidneys in diabetes mellitus are often found healthy, but more commonly perhaps they are large, congested, and their vessels easily injected. In some few instances the kidneys have been found smaller or harder than usual, or to have undergone granular degeneration, or to have been beset with hydatids; but these forms of structural disorganization often exist without any tendency to diabetes, so that such conditions are altogether accidental. All pathologists therefore are agreed that diabetes mellitus is a disease of function.

Much speculation has been entertained whether the sugar contained in diabetic urine is formed by the kidneys, or is merely separated by them from the blood. Dr. Prout advocates the first opinion, and thinks the albumen of the blood is the radical from which not only urea and lithate of ammonia, but also sugar, are capable of being formed, and the following table will perhaps best show the foundation of this hypothesis :—

Elements.	Albumen.	Urea.	Lithic Acid.	Sugar.
Hydrogen	8·75	2·5	1·25	1·25
Oxygen .	30·00	10·0	15·00	10·00
Carbon .	56·25	7·5	22·50	7·50
Nitrogen .	17·05	17·5	17·50	0·00
	112·05	37·5	56·25	18·75

Whether the hypothesis of Dr. Prout be the true one is perhaps uncertain; but the formation of sugar by the kidney is rendered something more intelligible by the fact of the quantities of hydrogen and of oxygen in sugar being the same as those in water, and we have only, therefore, to account for the addition of the carbon, which exists abundantly in the blood, and the elements of sugar are palpable.

The hypothesis of sugar existing in the blood, and only separated by the kidney, has long been entertained; but even the delicate manipulations of Wollaston failed to detect it. Ambrosiani, of Milan, and Dr. Charles Maitland, however, are said to have obtained crystals of pure sugar from the blood, and also a larger portion of fermentable uncrystallizable syrup. More recently, Mr. Macgrigor, by coagulating and drying the albumen, then boiling it in water, and afterwards concentrating the decoction, obtained a syrupy fluid, which fermented for several hours with yeast; while Dr. Christison has even obtained sugar, but only in the proportion of one grain to eight ounces of blood.

The source of the sugar, according to Mr. Macgrigor, is the stomach, which generates it during digestion, when, in consequence of an imperfect chymification, it is afterwards taken up by the lacteals. In proof of this supposition, he states that he has repeatedly found sugar in the matters vomited after digestion had begun, and even in a case where nothing but animal food had been taken for a long time, and also that he has abundantly detected it in the fæces.

Symptoms.—The early symptoms of diabetes mellitus are obscure. Dr. Prout conceives there is a stage which precedes the formation of sugar, and which is marked by a superabundant and highly dense urine, loaded with an excess of urea. But much uncertainty prevails on this point, and nothing is assured except that the constitution is not greatly affected till the saccharine matter forms. In some very few instances the quantity of urine passed is hardly greater than in health, but more commonly it is in great excess, amounting to eight, ten, sixteen, thirty, and even more pints, so that the patient is incessantly disturbed in the night, and loses his sleep, while the urethra and prepuce are inflamed and sore.

At this period his health begins to give way, his thirst is intense, and he often drinks many quarts, or even gallons, in the course of the day. But as the quantity drank is generally less than the quantity of urine passed, being in some instances only as one to four, his bowels are costive, and his fæces hard and dry; his appetite is capricious, his skin harsh and moistless, and he becomes greatly emaciated, loses all sexual desire, and it is said all sexual power. In advanced cases, the drain upon his constitution is so great that the alveolar processes are absorbed, and his teeth, loosened in their sockets, fall out. These symptoms are much relieved by medicine, and life much prolonged; but often, when the case appears most favourable, a latent phthisis, or other affection of the lung, breaks out, and he sinks under this unconquerable and intractable disease.

When the diuresis is considerable the urine should be examined, and its constituents determined; and the readiest solution of the problem is to taste it, and if it be sweet there can be no doubt of the nature of the disease. The chamber-vessel should also be examined, as also the flap of the patient's breeches, for crystals of sugar often form in the one as well as on the other. If we proceed chemically, a portion of urine, which is usually of a light straw colour, should be taken, and its specific gravity determined; and if greater than 1020° it should be evaporated, and if sugar be present we shall have a dark-brown residue, something like treacle. This extract, like the natural sugars, consists of crystallizable matter and of an uncrystallizable syrup; and to separate them Dr. Christison recommends that the extract be agitated with rectified spirit, and the residue boiled in another portion of the same fluid, when, on cooling, the crystallizable sugar will separate in light greyish grains like grape-sugar. Again, if sugar should be suspected to exist, but only in minute quantity, a small portion of yeast should be added to a small quantity of the urine, when, if sugar be present, fermentation will ensue, and each square inch of carbonic acid given off corresponds nearly to one grain of sugar. This test is so delicate that one part of diabetic urine, according to Dr. Christison, may be detected in 1000 parts of urine of the density of 1030.

Another method of determining the presence of sugar in the urine arises out of an experiment by Dr. Wollaston, who showed that when fluids of different densities are superposed one on the other, we have the phenomenon of double refraction. If a portion of diabetic urine, therefore, be left to stand for a few hours, the sugar will gravitate towards the bottom of the glass; and in this manner two fluids of different densities are formed, and the phenomenon of double refraction rendered apparent.

The density of diabetic urine, however, is one of the best tests. This fluid varies in density from 1020° to 1055°; and when the urinometer stands above 1030°, we may confidently affirm that sugar is present. The quantity of sugar present has been calculated by Dr. Henry at 1020° to be ʒ vj. ℈ ij. gr. ij. in every pint, while at 1050° it contains ℥ j. ʒ vij. ℈ ij. grs. xviij. of sugar—the increment being, as he conceives, one scruple, or nearly so, for every degree of specific gravity between the extremes that have been mentioned. If these data be correct, a person passing 16 pints of urine daily, of specific gravity 1050°, actually passes nearly 2 lbs. avoirdupois of sugar.

As sugar is a non-azoted substance, it has been supposed that diabetes mellitus indicated a non-azoted diathesis of the kidney; and, consequently, that urea was always deficient in this disorder in proportion to the quantity of sugar secreted. It has been shown, however, by Henry, that although urea could not be detected by the ordinary methods of analysis, still that diabetic urine gave off carbonate of ammonia at a boiling temperature—a substance, he conceived, that could be derived from no other source than urea. At length Mr. Macgrigor, by first destroying the sugar by fermentation, and then concentrating the urine and treating it by alcohol, obtained in one case 43 parts of urea in 1000 of diabetic urine, or nearly 50 per cent. more than healthy urine contains; and Dr. Christison has obtained it in several instances by a similar process of fermentation, and then treating the urine with nitric acid.

The duration of this disease is very various; it always lasts many months, generally two or three years, and sometimes the patient has reached a moderately advanced age.

Diagnosis.—The sweet taste of the urine, the crystallization on the clothes of the patient, and the peculiar treacle-like syrup which remains after evaporating the urine, distinguishes this disease from all others.

Prognosis—The ultimate issue of every case of diabetes is probably fatal; at least the number of cases in which the urine is rendered natural is extremely small, and many of them, at the moment the disease seems to have yielded, die of phthisis; even when the presence of the saccharine principle has been so far conquered that it alternates with lithic acid deposit, or that lithic acid becomes the prominent feature, the circumstance is any-thing but favourable, for I have noticed, says Dr. Prout, that such individuals generally die of some sudden and overwhelming attack of internal inflammation or of apoplexy.

Treatment.—There are few diseases in which the treatment has been more varied than in diabetes mellitus. The emaciated state of the patient would seem to present an insurmountable obstacle to bleeding; but, nevertheless, this mode of treatment has often been practised, and as much as 160 to 170 ounces of blood have been taken in a few weeks. Mercury has been used as an adjunct to bleeding, and separately; first as an alterative, then to touch the gums, and lastly to produce profuse salivation. But neither bleeding nor mercury, separately or conjointly, have been found of any benefit. Opium has been given to the extent of 100 grains in the 24 hours; but with an equal want of success. The whole materia medica has been exhausted in search of a remedy for this disease; and the metals, the fixed and volatile alkalies, the vegetable and mineral acids, all the astringents, purgatives, emetics, diaphoretics, diuretics, and tonics have in their turns been exhibited, and each has, perhaps, afforded some relief; but the disease has proceeded, and finally it may be said nearly every patient has fallen. Dr. Prout, who considers it merely as a form of dyspepsia, conceives that each case may require a different treatment.

The little benefit derived from medicine induced Dr. Rollo to try the effects of an entirely azoted or animal diet; and out of nineteen cases two are said to have been cured by this means. A full and generous diet is unquestionably useful in these cases; but the patient soon gets disgusted with mutton or beef, or both, for breakfast, dinner, and supper; he consequently nauseates it, and abandons it altogether. A diet of salt fish was attempted in one instance; but the patient in a short time so loathed it that it was given up. A mixed diet, therefore, if contra-indicated by theory, is at least the best to adopt in practice. It will be evident, however, that those vegetables which contain a large quantity of saccharine matter should be avoided in some degree, as potatoes, grapes, or other very ripe fruit, and, *à fortiori*, sugar itself.

Of Urinary Deposits.

In the diseases of the functions of the kidney that have been mentioned, the urea, sugar, or other product has been held in solution. Two of the natural constituents of urine, however, as the phosphates and the lithates, although held in solution in that fluid in the proportions of health, yet being in excess become deposited, forming urinary sediments, and which, being precipitated in an amorphous state, are termed *sand;* in a crystallized state, *gravel;* and when concreted into masses, *stone* or *calculus*. Besides this excess of the natural constituents of the urine, there are also some other precipitable substances occasionally found in the urine, which are entirely new or morbid formations, as the oxalate of lime, and the xanthic and cystic oxydes, substances, although soluble, perhaps, in certain proportions in healthy urine, yet being in excess become deposited, and form urinary sediments, which for the most part concrete into calculi. The diseases produced by these different substances are termed Lithuria, Ceramuria, Oxaluria, Cystinuria, and Xanthuria. Our knowledge of urinary deposits, of whatever kind, is principally due to Scheele, Marcet, Wollaston, Yelloly, and Prout. The frequency of calcareous formations is not great, for 299 cases only are reported to have died of these diseases or of stone in England and Wales, in 1839.

Lithuria, or *Lithic*, or *Uric Acid Diathesis*, is that form of disease in which the lithates are secreted in such excess as to be deposited in inordinate quantities in the chamber-vessel on the urine cooling; or when in still greater abundance, deposited in an amorphous or crystallized state, either in the cavities of the kidneys or bladder. The specific gravity of this urine varies from 1015 to 1035, and always gives an acid re-action, and is of a deep copper or red colour.

Remote Cause.—Persons labouring under idiopathic uric acid diathesis are in other respects generally healthy, and the remote cause is for the most part referred to errors in diet, to sedentary or indolent habits, and, as this class of persons are for the most part nervous, to every atmospheric change. If we analyze the first of this series of causes we find that a too full animal diet, as rich old black meats and game, are among the most frequent. When the predisposition, however, to this diathesis is great, every substance, even the most opposite, that causes indigestion will produce it, as a heavy dumpling or new bread, the richer sort of fish or salted meats, acid fruits, or saccharine matters. Among wines, port is found too heavy, and claret and the lighter French wines too acid; while champagne, cider, and malt liquors are still worse, from the rapidity with which they ferment and turn acid.

Besides being the result of many errors in diet, a deposit of the lithates is incident to many diseases, as gout and rheumatism. It is also often a critical termination and first faint indication of recovery from fever, or severe form of inflammation. It is also imagined to result from morbid states of the liver. Besides denoting remote diseases, it sometimes results from an irritable state of the bladder, or from stone in the kidney or bladder.

Predisposing Causes.—The effects of diet are so marked in children, that we can hardly feel surprised that any error of diet, as overfeeding them, should be followed by lithic acid deposits. Stone cases are consequently common in children, and occur chiefly among those of the lower class, in whom those errors are likely to be most considerable. It is supposed that when stone forms in childhood that the ages most affected are between four and nine years. But of 506 children operated on at the Norwich Hospital, 223 were under 12 years of age, while 271 were between 14 and 15. Now two-thirds of all the cases of stone result from an uric acid diathesis. After these periods the ages of 40 and upwards present the greater number of cases of gravel, either because the frame now begins to break, or that increasing age enables us to enjoy the pleasures of the table, as well as to lead a more sedentary life. Majendie has assigned as a cause of these morbid states of urine in the extreme of life that the temperature of the body is from one to two degrees below the healthy standard of the adult.

Both sexes are liable to this affection; but taking stone cases as a test, men are infinitely more liable to uric acid deposits than women, for, according to Dr. Marcet, of 2216 cases operated on, only 88 were females. In many instances this disease appears to be hereditary, and the parties attacked are usually of sthenic constitution.

Pathology.—Lithic acid deposits not only occur when the patient is in his best health; but in many persons who have fallen labouring under this diathesis the kidney has been found healthy. Lithuria consequently arises from a mere derangement of the functions of the kidney. Indeed so purely is it a disease of function that the healthy kidney has been found occasionally studded all over with crystals of uric acid. Uric acid diathesis, however, may co-exist with most forms of disease of the kidneys, ureters, or bladder. It is by no means uncommon to find a calculus of this substance the nucleus of a mulberry or other calculus formed in the tubuli or pelvis of the kidney, and sometimes in the bladder.

Much difference of opinion prevails respecting the chemical nature and solubility of what is usually termed lithic acid. The analysis of Dr. Prout, however, on this subject is most generally received in this country. This eminent physician states that lithic acid may be precipitated in a crystalline form from urine that contains it by the addition of any mineral acid. The crystal is of a rhomboidal or cubic form, the latter being much the most rare, and is readily detected, on evaporation, by the microscope; it is white, tasteless, and inodorous, insoluble in alcohol, and very sparingly soluble in water, or requiring 10,000 times its weight of that fluid at 60° for solution. It reddens litmus paper; unites with alkalies, forming salts; and undergoes no change by exposure to air. On analysis it gives,

Carbon . .	36	or	6	equivalents.
Hydrogen .	2	or	2	ditto.
Oxygen. .	24	or	3	ditto.
Nitrogen .	28	or	3	ditto.
	90			

These crystals, when treated with nitric acid, still form colourless crystals of a similar shape, and have an acid re-action, but what is remarkable is, that they form pink, red, or purple-coloured salts with an alkaline base, or different proportions of an alkali, and are hence termed by chemists purpuric acid, erythric and rosacic acids.

The different acids which have been described readily combine then with ammonia, with soda, or potash, and form with them super-lithates, lithates, and sub-lithates. The super-lithate of ammonia or the super-purpurate of ammonia are those, however, which are most generally found in urine. They give an acid re-action, and one part is soluble in 480 parts of water at 60°. In healthy urine they usually exist in the proportion of one part in 1000, which, taking the temperature of the body at 98, gives a three-fold excess of the solvent.

The colour of these salts varies greatly. The pure sub-lithate of ammonia is white; but, owing to the presence of the colouring matter in the urine, it is usually deposited of a yellow or wood colour. The purpurates, owing either to the nature of the colouring matter of the urine, or else to other circumstances not yet determined, are deposited of a pink, light red, or brick colour. These different salts may be deposited in a crystallized or in an amorphous state. The yellow amorphous sediments form calculi; but it is remarkable the red amorphous sediments in no instance are known to concrete into a calculus.

The lithic acid which exists in healthy urine in such a state and in such proportions as to be held in solution at ordinary temperatures, in certain conditions of the system may be precipitated from that secretion in a *crystallized* and nearly pure state, a specimen of which is now before us. In other states, or, according to Dr. Prout, when no febrile action exists in the system, the crystallized lithates are usually stained with the deeper tints of the yellow colouring matter of the urine, and are sometimes of a dark brown or red, so as to appear at first sight almost black. When, however, the patient labours under febrile action they are generally more or less of a red or lateritious colour; but in no instance has the same great authority seen crystallized lithates of a pink colour.

The *amorphous* and impalpable lithic acid sediments consist in general of lithic acid in combination with ammonia, and only in a very few instances with soda. The sedimentary deposits of the lithates of ammonia may be yellow, pink, or red; while the sedimentary deposits of the lithates of soda are white. The crystallized salts form gravel. The yellow amorphous sediments may concrete in the bladder or kidney, and form calculi.

In general the lithates and purpurates, whether in a crystalline form or as an amorphous sediment, even when in great excess, are held in solution at the temperature of the body; but in some instances their superabundance is so great that they are deposited, even at this temperature, either within the bladder or kidney, so that the last portions of urine are so loaded with them as to resemble a stream of blood. If the excess be yet greater, or if a nucleus be present, a concretion may form either in the kidney or bladder, but infinitely more commonly in the former. The nucleus may be either a piece of hardened mucus, or a portion of fibrine or other substance, or it may be a crystal of lithic acid. The formation of crystals of lithic acid has been variously accounted for. Dr. Prout thinks they may be deposited in the kidney as a gelatinous hydrate; or that they may be precipitated by the presence of nitric acid depriving the acid of its base; or that a portion of thickened mucus may afford a nucleus on which they may shoot and crystallize. In whatever manner, however, the nucleus may be formed, or of whatever substance, around this nucleus the amorphous sediments are gradually deposited. The calculi thus formed are of very different sizes, sometimes so minute as to be not bigger than a pin's head; but if longer retained they acquire a magnitude from a walnut to a goose's egg.

Calculi of pure lithate of ammonia are so rare that their existence has been denied; but they have been met with in infants and children. Lithic acid calculi are, therefore, generally lithate of ammonia mixed with many impurities, and are hard, of a light clay, fawn, or wood colour, for the most part smooth at the surface; and the concretion, when sawn in two, is found to be composed of concentric layers, like an onion. The simplest test of this form of calculus is nitric acid, which readily dissolves it, and on evaporation yields purpurate of ammonia.

The lithates, however, are very frequently only the nucleus of a calculus of different formation, as the phosphates or oxalates. Indeed we not unfrequently see the lithates, the phosphates, and the oxalates deposited in alternate layers in the same calculus, thus affording absolute demonstration of three or four different diatheses having prevailed during the formation of the same calculus.

Symptoms.—The fact of lithic acid being in excess is palpable enough, from the yellow, red, or pink deposit in the chamber-vessel as the urine cools; and when this is moderate in quantity the patient, perhaps, suffers neither local nor general inconvenience; indeed many persons are never better than when they are passing an excess of the lithates. When, however, it is deposited as an amorphous sediment in the bladder, the last portions of urine are so loaded with it, that the patient apprehends he is passing blood. In this case, in the first instance, he is only troubled with itching and pain in the urethra in making water; but if the disease becomes chronic the bladder becomes irritable, the urine loaded with mucus, the healthy sympathy between the bladder and prostate is destroyed, so that the urine is only passed after great forcing, and in trifling quantity, and his sufferings are singularly painful and severe. The secretion of a great excess of the lithates is seldom a purely local disease, but is usually vicarious of, or accompanied by, some more general affection, as cardialgia, asthma, palpitation of the heart, rheumatism, or gout; and during its continuance these diseases often, in a great measure, subside.

Although the passage of an amorphous sediment, unless it be in such quantity as absolutely to obstruct the passage, is seldom productive of much local inconvenience, unless it be of long continuance; yet when the lithic acid crystallizes so as to form gravel, or a still larger concretion, the expulsion of this foreign body is always attended with much pain, and gives rise to what has been termed nephritic colic.

Colica Nephritica.—The passage of a calculus from the kidney into the bladder may be preceded by dull pains in the back and some sickness; but more commonly the attack is sudden, and the patient, perhaps, in his best health, and engaged in the ordinary transactions of life, is on the instant seized with excruciating agony in the loins, with retractation of the testicle, irritation of the bladder, and often with nausea and vomiting; but in all this suffering the pulse retains its healthy frequency, and the heat of the body is natural. At length the pain intermits, and the patient has a short interval of ease. The paroxysm, however, returns more or less frequently, till the patient is relieved as by a charm, the calculus having passed into the bladder. Again, after an uncertain interval, the gravel or calculus becomes impacted in the neck of the bladder, when the same phenomena present themselves, but have a different locality, or the urethra, till at last, after an effort to pass water, the noise of a stone falling into the chamber-vessel is heard, and the gravel or calculus is found.

The duration of this fit is very various, lasting perhaps from one hour to many, and sometimes continuing for many days. Occasionally, however, the calculus has acquired so great a magnitude that it becomes impacted in the ureters and death has ensued from this cause. In general, calculi pass from one kidney only at a time, but sometimes they pass simultaneously from both kidneys; and should they be large, or the passage long, an entire suppression of urine has been the consequence, and the patient has fallen from that cause.

Sometimes the calculus so rapidly increases by sedimentary deposits that it is detained altogether in the kidney, when it not only takes the form of the pelvis of the kidney, but branches out in every direction like a piece of ginger. In a few instances, a calculus thus formed in the kidney may lie latent and cause little inconvenience to the patient, as in the case of the daughter of Sir Richard Steele, who was found to have one of these large calculi in the kidney, although she had made no complaint referable to that organ during life. More commonly, however, the calculus acts as a foreign body, and the kidney becomes the seat of abscess or other disorganization, and the patient suffers immensely with pains in the back, irritability of the bladder, aggravated by the frequent discharge of pus, of blood, or mucus. Existence under these circumstances becomes a burthen; and death, long prayed for, at length terminates the patient's ceaseless sufferings.

A calculus having passed into the bladder sometimes increases so fast that it acquires a magnitude too great to escape by the urethra, and in this case a stone in the bladder is formed; and this disease, as it necessarily requires an operation, will be found treated of under the head of surgery.

Diagnosis.—The red lithates can alone be confounded with blood, and from which, when intense in colour, they often can with difficulty be distinguished. On cooling, however, the subsidence of an impalpable or gritty deposit, the presence generally of much mucus, the absence of fibrine, and also of albumen, when the urine is treated by nitric acid, enable us readily to distinguish them. The white or light-coloured lithates are distinguished from the phosphates by the urine being acid, by the absence of the abundant mucous discharge which always accompanies a large deposition of the phosphates, and from the urine not becoming alkaline or fœtid if kept for a few hours. The precipitated lithates also are readily dissolvable by heat, which the phosphates are not.

Prognosis.—While the deposits are yet but sedimentary, the prognosis is always favourable, however large the quantity discharged. Even when gravel or small calculi are formed, the chances are very many that it will be discharged before it attains any considerable size. When the calculus is so large, however, as to be retained in the kidney or ureter, the disease is necessarily fatal. Also, when retained in the bladder, nothing but a surgical operation can remove it; and consequently the chances resolve themselves into the proportionate numbers which recover or fall after the operation of lithotrity or lithotomy at the age and under the circumstances of the patient.

Treatment.—The medical treatment of the lithic acid diathesis is extremely well determined, or by alkalies or neutral salts, turpentine, and saccharine matters.

The celebrated Morgagni suffered greatly from lithic acid gravel, and his remedy was, half a drachm of carbonate of potash night and morning, gradually increasing the dose till he took three drachms during the day. " The acid of his urine," he states, " soon became saturated, the pain in his loins diminished, his urine became less loaded, and potash was at length found in that fluid in excess." He also adds, " I have repeated this remedy as often as I have been threatened with an attack, and always with success." The particular salt, however, is not perhaps of great moment, for Sir Gilbert Blane found his patients much benefited by the citrate of potash, or the common effervescing draught. When the patient's bowels require a more active agent, the sulphate of magnesia, the sulphate of soda, or the iodide or bromide of potash may be substituted.

The pure alkalies, from the much smaller doses in which they can only be administered, are much less beneficial than the neutral salts. Magnesia, also, in Mr. Brande's experiments, produced much less marked effects on the urine than either the subcarbonate of potash or soda, while lime-water produced no very sensible effect whatever.

Besides alkalies, turpentine has some character in the cure of the lithic acid diathesis. The celebrated Dutch drops are supposed to be principally composed of sp. terebinthinæ and of tinct. opii, coloured by petroleum. Dr. Henry gives two cases of the beneficial effects of this remedy. One of them was a lady, who, when threatened with an attack, always had recourse to it, and the uniform effect was the discharge of a sandy substance in such quantities that often four ounces were discharged in two or three days. The other instance is of a similar description.

The above-mentioned treatment is often successful; but there are cases in which it fails, and the patient continues to be tormented for months with little relief. In these instances, the inf. diosmæ or the pulv. uva ursi may be tried, combined with some mild opiate, which latter substance always gives relief.

If the urinary sediment should concrete into gravel, an attack of nephritic colic may take place. The treatment of this attack is the same as for the passage of a gall-stone; or the warm bath, mild purgatives, and opiates. The inexperienced practitioner should be cautioned against the use of blisters lest the absorption of the peculiar principle of the lyttæ should occasion stranguary.

If the calculus, having escaped from the kidney, is retained in the bladder, an operation for its removal is necessary, and the case now becomes purely surgical.

Dietetic Treatment.—The dietetic treatment is of the greatest importance in the cure of the lithic acid diathesis. The experiments of Wollaston and Vauquelin have shown that in proportion as animals are fed on animal diet or on azoted substances, their urine becomes more and more loaded with lithic acid. While Majendie has shown by a counterproof, if a dog be fed on non-azoted substances, as sugar, every trace of lithic acid disappears from the urine. A lady at Paris, suffering from gravel, having heard of Majendie's experiments, made trial of sugar on herself, eating more than a pound daily. She persevered in this regimen for six weeks, when her gravel disappeared. She now returned to her old regimen, and at the end of three months her fits of gravel returned.

It is plain, therefore, that the quantity of animal food should be reduced. It is necessary also that port as well as French wines should be abandoned, as well as all those things which, according to the idiosyncrasy of the patient, are likely to produce indigestion or acidity of the stomach. The patient also should be warmly clad, rise early, and take a considerable portion of exercise.

Ceramuria or *Phosphatic Diathesis.*—The phosphates are secreted in a state of health in the proportion of one part in 1000 of urine. When this proportion is abnormally increased, so that they are largely deposited either in the kidney or bladder, or even in the chamber-vessel, they produce the disease termed the phosphatic diathesis.

Remote Cause.—The remote causes of this affection are exposure to cold and wet, poor diet, blows on the back, and more especially diseases of the bladder, as vesical catarrh, stone in the bladder, the introduction of a bougie, or other irritating cause.

Predisposing Cause.—This form of disease sometimes occurs in children, but more commonly in adults between thirty and forty years of age. It affects both sexes, but more commonly the male than the female. The party affected is usually of an asthenic, pale, leucophlegmatic temperament, and in most instances is supposed to have inherited it.

Pathology.—This affection, though often resulting from disease of the bladder or kidney, yet occasionally exists when no such disease is present, and consequently is essentially a disease of function. It is the prevalence of this diathesis that causes those large calculi sometimes found in the kidney or bladder.

The elements of this diathesis exist in the blood; for the red particles, the albumen and fibrine, when burnt, all yield a small portion of the earthy phosphates. Berzelius is of opinion that, previous to incineration, they exist in the blood in the states of phosphorus, of calcium, of magnesium, of sodium, and of potassium the office of the kidney being to acidify the phosphorus and combine the phosphoric acid with these different bases, according to their affinities and quantities. In healthy urine these salts exist in the state of the biphosphates, and in the proportion of one part in 1000. So that, supposing one part of these salts to be soluble in 480 parts of urine at 60°, the solvent at 98° is about two-thirds in excess. These salts, like the super-lithates, have the property of reddening vegetable blues, and they show an acid re-action. When the earthy bases of lime or magnesia are from any cause secreted in greater abundance than natural, they combine with the biphosphates, which are now thrown down in the form of insoluble phosphates, and which may be deposited either as a sediment on the urine cooling, or in the bladder or kidney before being passed, or else being retained in those cavities may concrete into a stone or calculus.

Symptoms.—When this diathesis is a primary affection, the party is usually of a sallow complexion, stout, but effeminate, and of great irritability of nerve. He also suffers from indigestion, flatulence, constipated or disordered bowels, his stools being either black or clay-coloured. His bladder also is highly irritable; he has a pain in his back and loins; his urine is abundant and loaded with mucus, together with a copious white sediment, so that the latter portions of urine pass like so much milk.

The duration of this disease is often very chronic, on account of the diseased state of the bladder, with which it is connected. In cases, however, in which that viscus is healthy, it often readily yields to medical treatment; but in other instances, when all appears to be proceeding favourably, the lungs become affected and the patient dies of phthisis.

The urine, when examined, is pale, increased in quantity, often turbid, and covered with an iridescent pellicle or film, consisting of a solution of the triple phosphate of ammonia and magnesia; much mucus is also deposited, together with a most copious precipitate of the phosphates, so that sometimes the urine appears like so much chalk and water. It is singular, however, that although the urine is so loaded with foreign matters, it is generally of low specific gravity, or 1001, 1002, or 1003.

As the phosphates have little tendency to crystallize, a nucleus is necessary before the sediment can concrete into calculi; and it is in this form of disease that we find such singular substances in their centres, as a clot of blood, a piece of hardened mucus, broken ends of sounds or bougies, bits of straw, bodkins, pins, plum-stones, beans, nut-shells, and bullets.

The calculi which form on these nuclei are of three descriptions and in the following proportions. Out of 108 calculi examined there were of—

Phosphate of lime, nearly pure. .	8
Triple phosphate, or phosphate of ammonia and magnesia . . .	3
Mixed or fusible calculi, being a mixture of the two preceding .	91
	102

These calculi are distinguished from all other calculi in being soluble in an excess of phosphoric acid. They are distinguished from one another by the phosphate of lime calculus being nearly infusible, by the mixed being readily fusible, while the triple phosphate is known by the minute crystals which often form between the interstices of the laminæ.

Every other form of calculus, whether the lithate or the oxalate, from the irritation it occasions, constantly produces a deposit of a soft coating of the phosphates. When, however, the phosphatic deposition is once well established, it is seldom followed by the deposition of strata of any other description. Thus of 823 calculi examined by Dr. Prout, he found only three specimens in which the phosphates had been followed or surrounded by other calculous deposits; and hence he deduces the important law, that a decided deposition of the phosphates is not followed by one of any other description.

The physical characters of the phosphatic calculi are, that they are white, soft, and easily broken down, and are deposited in concentric laminæ like the lithic acid concretions.

Diagnosis.—The phosphatic sediments may be distinguished from the lithic by the urine, though at first acid, becoming putrescent, and giving an alkaline re-action after standing a few hours. Ammonia also added to the urine throws down a white cloud, which consists of the phosphate of lime with some of the ammoniaco-magnesian phosphates, a test which would render the lithates soluble. The best test, however, is the addition of phosphoric acid, which would re-dissolve the precipitate.

Prognosis.—When this diathesis is unaccompanied by disease of the bladder the prognosis is always favourable. When, however, it results from a morbid state of the bladder or diseased structure of the kidney, the disease is always of long duration. Should metastasis take place to the lungs the disease is fatal.

Treatment.—The treatment of this affection is by some mineral acid combined with an opiate. The acid is not very important; and the nitric, muriatic, the phosphatic, or the sulphuric are equally beneficial; but the dilute sulphuric acid is generally preferred as being most pleasant to the taste. The most usual remedy therefore is the infusi rosæ, with an addition of ♏v. to ♏x. of dilute sulphuric acid, together with tinct. opii ♏iij. to ♏v. every six hours. This combination is generally so powerful in checking this affection, that the sulphate of magnesia may be added to it if the bowels should require to be regulated.

When the phosphatic diathesis depends on vesical catarrh, or other diseased state of the bladder, salicinæ gr. x. ter die has occasionally been found successful. Others prefer the inf. diosmæ, and others uva ursi. It is decidedly bad practice to use the pure alkalies in these cases.

Dietetic Treatment.—The diet should be as nourishing as the state of the diseased viscus will allow; and acid, wines, and ripe fruits greatly assist in effecting the cure.

Oxaluria—Is that diseased function of the kidney by which oxalate of lime is secreted, a fact first determined by Dr. Wollaston.

Remote Cause.—The remote cause of this disease is not determined, for persons in the best health will often void an oxalate of lime calculus. It is supposed, however, to be most frequent among those who eat largely of common sorrel (rumex acetosa), or of tomata (solanum lycopersicum), and of the leaf-stalk of the rhubarb plant, all of which many persons are passionately fond, and all of which contain oxalic acid.

Predisposing Causes.—This form of disease may exist before puberty, and from that period till sixty, beyond which age Dr. Prout has met with no case. It is most usual, however, between forty and fifty. It attacks both sexes, and is not incompatible with gout.

Pathology.—This disease is decidedly a disease of function, and not connected with any known alteration of the structure of the kidney.

Oxalic acid being composed of carbon 33·99, and of oxygen 53·33, the elements of this acid exist abundantly in the blood, and probably in many instances this formation takes place entirely from a vitiated action of the kidney. The experiments of Woehler, however, have, he thinks, proved beyond a doubt that the oxalic is one of the few acids that make their way into the torrent of the circulation, and are eliminated, both free and combined with a base, from the kidney. He caused a dog to swallow two drachms of oxalic acid mixed with a quantity of bread and meat, and on examining the urine it was found to deposit a precipitate on cooling, and a further precipitate on the addition of nitrate of lime. On both precipitates being collected, they were found to consist of oxalate of lime, almost demonstrating that the oxalic acid must have been carried directly from the stomach to the kidney.

The oxalate of lime very rarely appears under the form of an amorphous sediment; still it has occurred mixed with the lithic amorphous sediments, but even this is uncommon. Its appearance is still more rare under the form of crystallized gravel, so much so that Dr. Prout mentions only two instances. Renal calculi of this formation are not very uncommon, since Dr. Prout mentions having met with twelve cases. When detained in the bladder they often acquire a considerable size, are rugged, dark-coloured, and tuberculated, and from these appearances have been termed the "mulberry calculi." Oxalate of lime enters as a constituent part into about one-fourth of all the calculi examined. The following table will show the different transitions:—

Oxalate of lime.	113
Lithic and mulberry . . .	15
Mulberry and lithic . . .	40
Mulberry and phosphates . .	49
Fusible and mulberry . . .	2
	219

When heated before the blow-pipe the oxalic acid is decomposed, and pure lime remains, which gives a strong brown stain to moistened turmeric paper. This calculus is insoluble in the alkalies, but by digestion in carbonate of potash it is decomposed, and the insoluble carbonate of lime is left. When reduced to powder and digested in nitric or muriatic acids a perfect solution is effected. It is not dissolved by acetic acid—a circumstance which distinguishes it from the ammoniaco-magnesian phosphate. It is distinguished from the phosphate of lime by being insoluble in phosphoric acid.

Symptoms.—This disease is attended with no prominent feature. The urine, which contains this substance, is acid, of a good colour and remarkably pure, and free from all sorts of sediment as well as gravel. The patient is therefore hardly sensible of any inconvenience till he is attacked by a fit of nephritic colic, caused by the passage of the calculus from the kidney or bladder, or else till he is troubled, supposing it to be retained, by symptoms of stone in the bladder or kidney.

Diagnosis.—The mode in which this calculus may be distinguished from all others has been already described.

Prognosis.—It is seldom that a second calculus of the oxalate of lime exists in the kidney after one has been passed. When it is detained in the bladder the patient is of course submitted to the accidents of a surgical operation.

Treatment.—Very little is known respecting the medical treatment of this calculus. Dr. Prout recommends, after passing a mulberry calculus, that we should induce a lithic acid diathesis; but it must be questionable whether the disease substituted is not as dangerous as the one under which the patient originally laboured. He speaks, however, of having seen much advantage derived from mineral acids and the sulphates of iron or of quina. The fixed alkalies often do absolute mischief.

Dietetic Treatment.—The patient should carefully avoid eating all substances containing oxalic acid. A gentleman who had lived as a *bon-vivant*, determined to reform his diet, but to render his new dishes more palatable, he ate every day a plateful of sorrel, and was attacked with an oxalate of lime calculus.

Cystinuria.—The cystic oxyde was described by its discoverer, Dr. Wollaston, in the 'Philosophical Transactions for 1810;' and from the similarity which this substance bears to certain oxydes in uniting both with alkalies and acids, Dr. Wollaston termed it an oxyde, and gave it the name of cystic oxyde, on the supposition of its being peculiar to the bladder. Dr. Marcet, however, has found it in the kidney. This substance has only in a few instances been discovered, but is suspected by Dr. Prout not to be infrequent.

Remote Cause.—The remote cause of this disease is entirely unknown.

Predisposing Causes.—The first calculus examined by Dr. Wollaston of this description was taken from a boy five years old. It has been found also in the adult; and Professor Stromeyer found it in two instances in one family, and it is supposed also to be hereditary.

Pathology.—The cystic oxyde diathesis is probably a disease of function, but in most of the instances examined at present, the kidneys have been found diseased. An analysis of this concretion by Lassaigne gives—

Carbon . . .	36·2
Hydrogen . .	12·8
Oxygen . . .	17
Nitrogen. . .	34
	100

The elements of cystic oxyde, therefore, exist plentifully in the blood. This substance appears to result from an original diathesis, and has been discovered in the urine in a state of solution, of mechanical suspension, and also in the solid form of a calculus, either pure or else incrusted with the phosphates or lithates. The concretion, when pure, is not laminated, but appears as one uniform mass confusedly crystallized through its whole substance, having somewhat of the appearance of the ammoniaco-magnesian phosphate, though more compact. Before the blow-pipe it emits a peculiarly fœtid smell, quite distinct from that of uric acid, and is consumed. It is characterized by the great variety of re-agents in which it is soluble. It is dissolved abundantly by the muriatic, nitric, sulphuric, and oxalic acids; by potash, soda, and ammonia, and even by the neutral carbonates of soda and potash. It is insoluble in water, alcohol, bicarbonate of ammonia, and in the tartaric, citric, and acetic acids. The urine in which this substance has been found was copious, of a yellowish green, of a strong peculiar smell, and of a low specific gravity, or 101148; it was entirely free from uric acid, and the urea deficient in quantity. This diathesis is of unfavourable prognosis, and its mode of treatment not yet determined.

Xanthuria is only known by the occasional existence of an exceedingly rare calculus, first discovered by Dr. Marcet, and has since been met with by Liebig and Woehler, and also by Professor Langenbeck, of Gottingen. Its chemical characters are hardly determined, but it turns yellow when treated with nitric acid, and it is supposed to be formed of the same elements and in the same proportions as lithic acid, only minus one atom of oxygen. The causes of this disease, as well as its treatment, are at present very obscure.

Dr. Marcet has also described a variety of calculus under the name of *fibrinous* calculus, which appears to be composed of the fibrine of the blood. Sir Benjamin Brodie has met with one specimen of this formation. It was of an oval shape, about the size of a horse-bean, yellow, semitransparent, not very unlike amber in appearance, but less hard. When dry it shrivelled up. Dr. Hodgkin found in the bladder of a boy after death a concretion which consisted of concentric layers of a white elastic substance, like coagulated albumen, and between each layer was a thin strata of very friable earthy matter, probably phosphate of lime. Nothing further is known of this unusual disease.

Of the Diseases of Function of the Uterus.

The functional diseases of the uterus are leucorrhœa, amenorrhœa, and its variety, chlorosis, and also dysmenorrhœa. This class of disease has been known since medicine was a science.

Of Leucorrhœa.

Leucorrhœa is a white or nearly white discharge from the vagina, unattended with pain.

Remote Cause.—This affection may arise from all those moral or physical causes which depress the system generally, and which act so powerfully on the frames of delicate females, as any severe mental suffering, the depression which follows high excitement, exhaustion caused by hot rooms, sudden or great changes of temperature, deficient nourishment, or, on the contrary, too stimulating a diet. Leucorrhœa, likewise, has many local causes, as the irritation and weakness caused by abortion or child-bearing, and in the latter case it often continues during the period of suckling.

Predisposing Causes.—Leucorrhœa is occasionally seen in young children, but is only common to adult age. It may attack women at all periods of life, but is most frequent from sixteen to twenty-five. It is a disease to which females of every temperament are subject; for, of nineteen cases given by Marc d'Espine, six were robust, nine moderately strong, and four only were sickly.

It is not uncommon to find the "whites" in young females occurring monthly, for a short time preceding the development of the catamenia, and for a few months after their appearance. At a later period of life a similar discharge often takes place at regular times in women labouring under amenorrhœa, and often continues until the natural secretion is restored. Leucorrhœa is also common in many women during the intervals of menstruation; and in these cases the discharge may increase for two or three days previous to the appearance of the menses, cease during their flow, but reappear after their subsidence. In other cases leucorrhœa alternates with menorrhagia.

Pathology.—The leucorrhœal discharge may proceed from the uterus, the vagina, or from both; but the structure of these parts, with very few exceptions, is perfectly healthy. Marc d'Espine* has shown this to be the case by a number of examinations made by the speculum; for he found the orifice of the uterus perfectly healthy in fifty-three cases, slightly red in thirty-five cases, and red and granulated in twenty-five cases. This disease is therefore strictly a disease of function. It has been asked whether this discharge is secreted by the mucous follicles, or by the web of the mucous membrane, supposing the uterus to possess one; and it seems most probable both systems are faulty in this affection. The pain under the left breast, which so often accompanies leucorrhœa, cannot be accounted for by any structural lesion, neither by any direct nervous sympathy. Valleix conceives it to be a dorso-costal neuralgia, but is unable to explain its occurrence as a symptom of this affection.

Symptoms.—The leucorrhœal discharge is usually of a bland muciform nature, and probably contains some albumen. Its quantity is often so considerable as to wet several napkins in the twenty-four hours; its consistency is various, or from a transparent and almost aqueous discharge to one of considerable thickness and opacity, while its colour differs from nearly a pure white to a blue or yellow.

The patient is not sensible of any increase of local heat, pain, or tenderness in the part from which the discharge proceeds; but her constitution is generally languid and weak, her complexion pale and sallow, and often with a dark areola under her eye. She complains of pain in her back, but the more characteristic symptom is a pain on the left side, sometimes on the right, and occasionally on both sides, and which is often constant, severe, and distressing. The tongue is generally clean, the pulse quick and irritable, and the bowels constipated. In a few cases the constitution sympathises more actively, and in these instances syncope, hysteria, and perhaps some local irritation, as bearing down, is present.

The duration of leucorrhœa is very various, but it seldom lasts longer than from two weeks to two months under medical treatment; but if left to itself, it is often many months in subsiding.

Diagnosis.—Leucorrhœa is distinguished from gonorrhœa by the moral character of the party, by the absence of all local pain, by the whiteness of the discharge, and by the pain in the side, which is often mistaken for pleurisy or for hepatitis, and the patient is sadly punished in consequence. In nineteen cases out of twenty, however, the existence of the leucorrhœa is sufficient to determine the harmless nature of the pain.

Prognosis.—The prognosis is in every instance most favourable.

Treatment.—The treatment may be general or local, or both conjoined. A large number of cases readily yield to a general treatment by the mineral acids. The infusi rosæ ʒxj. sp. ætheris nitrici ʒj., to which may be added magnesiæ sulphatis ʒj. should the bowels be costive, and also tinct. hyoscyami ♏xv. if there should he pain in the side, ter die, is a prescription very often successful. In the more obstinate cases the draught may be strengthened by ♏iij. to ♏v. of dilute sulphuric acid. If the patient at the same time be labouring under amenorrhœa, one to three grains of the sulphate of iron may be substituted for the æther; or, what is still better, ten grains of salicine three times a day. The cold bath, horse exercise, and country air are desirable adjuvants.

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* *Archives Générales.* February, 1836.

When the disease has resisted general remedies, some local treatment is necessary, and this consists of astringent injections thrown up the vagina by a syringe or India-rubber bottle. The most popular injections are the decoctum querci, or a drachm of alum dissolved in four ounces of water, or else a drachm of the sulphate of zinc to the same quantity of water, or ten to twenty grains of the nitrate of silver in the same quantity of distilled water. These injections should be administered slowly, the patient being in a recumbent posture. They seldom give any pain. Some difference of opinion exists as to the form of disease in which they are useful, for some practitioners rely almost entirely on them for the cure of vaginal leucorrhœa, but consider them as highly injurious when the discharge takes place from the uterus; while others use them in every case.

In very acute forms of leucorrhœa cupping from the loins, or leeches to the lower portion of the abdomen, are useful, and after this hip-baths and vaginal injections of warm water may be employed till the severity of the attack has subsided.

Dietetic treatment.—The diet in most cases of leucorrhœa should be light and nutritious, and a glass or two of some French or Rhenish wine greatly assists the patient's recovery.

Of Amenorrhœa.

Amenorrhœa is a partial or total suppression of the menstrual discharge at the usual periods.

Remote Cause.—Amenorrhœa arises, like leucorrhœa, in some women from great delicacy of constitution; in others from the luxurious routine of a London life. There are likewise many other more direct causes, as taking cold during the term of menstruation, and especially by getting wet in the feet. Any powerful mental or physical shock received during the same period is also a cause. Amenorrhœa is also a consequence of most severe disorders, as fever or phthisis.

Predisposing Causes.—It is difficult to say at what age, taking the extremes of adult life, a party may be said to labour under amenorrhœa, for great differences exist as to the time of commencement of the first menstruation and the termination of the last.

It may be stated, however, that the most general age of puberty in the female is about fifteen, and also that rather before fifty this sexual function ceases. Amenorrhœa is perhaps most common at these two extremes of adult age. In young women, for example, the first appearance of menstruation is often followed by an intermission of two, three, or more periods, after which this function is regularly performed unless some disturbing cause suppresses it. The middle periods of life are in most women occupied between pregnancy and suckling, so that a considerable portion of life is thus passed in a state of natural amenorrhœa. Towards the close of the menstrual period, however, the functions of the uterus are more feebly performed, and during the last three or four years menstruation often intermits, returns, and then ceases altogether.

Pathology.—In amenorrhœa the uterus retains its healthy structure. The only sensible difference is that the cervix is perhaps smaller and more pointed, but at the proper periods even this enlarges and assumes the natural and healthy form incident to that time. Amenorrhœa is consequently a result of mere disordered function of the uterus.

Amenorrhœa, besides being a mere functional disease, sometimes arises from congenital malformation; thus the uterus may be wanting, or it may be irregularly or incompletely developed. The canal in the cervix may be imperforate; there may be a membrane covering the os uteri; the vagina may be wanting, its sides adherent, or its orifice closed by adhesion, a false membrane, or an imperforate hymen. The ovaries also have, in some instances, been found wanting; nevertheless the persons in whom this defect occurs are in other respects well formed and healthy, and all the organic functions, save the one in question, fully performed. The bosom, however, of such women is not prominent, their voice is deeper than is usual, and a slight beard appears on the upper lip, so that there is a mixture of masculine and feminine peculiarities both of person and character in these individuals.

Symptoms.—Amenorrhœa may be partial or total, that is, the menses may be deficient in quantity or be delayed as to time, or may be altogether suppressed for one or more periods.

When amenorrhœa is partial the quantity may be smaller than usual. Thus the mean quantity lost amounts to about four ounces; but it may now be reduced to a mere show, and hardly soil more than one or two napkins. It may also be defective as to quality, being often much paler than usual. Again, amenorrhœa may be partial as to time, the menses appearing only every five or six weeks instead of every month. Again, the amenorrhœa may be total, the discharge not taking place perhaps till after the lapse of one, two, or more periods. Whichever form amenorrhœa may assume, the symptoms are nearly the same, and are usually divided into acute and chronic.

Acute amenorrhœa generally takes place from some cause acting immediately previous to or during the menstrual period, such as exposure to cold or wet, anxiety, fright, or an attack of fever or other severe disorder. In this case there is considerable febrile action, flushed face, a quick pulse, great pain in the back and side, and often much local suffering; while instances are known in highly excitable females of this apparently trifling affection terminating in insanity.

Chronic amenorrhœa is generally the result of much constitutional debility, and the patient at the usual mensual period has shivering; pain in the back and loins, and down the thighs; weight at the lower part of the abdomen, together with great lassitude and depression. These symptoms, having lasted a day or two, pass away without any menstrual secretion, and are repeated each succeeding month till there is a return to a healthy state. But the effects of this abortion are not so temporary, for in the intervals severe headache, throbbing, and a sense of fulness in the temples and pain in the left side are for the most part present. The appetite also is impaired, the bowels irregular, the countenance pale, the strength much reduced, together with paroxysms of hysteria or of palpitation.

The most exquisite form of chronic amenorrhœa, however, is *chlorosis*, or the *green* sickness. In this case, in addition to the previous symptoms, the countenance is singularly sallow, or of a yellowish green, and bloated, and the legs œdematous, with in general much arterial action, producing in the carotids the "bruit du diable." In many of these cases also the appetite becomes singularly morbid and depraved, while the patient's strength and spirits are depressed in the extreme; she is readily overcome, and bursts into tears on the slightest emotion, and generally passes much time in her room.

Amenorrhœa is sometimes accompanied by a vicarious hæmorrhage from some remote organ, and generally from the stomach, lungs, or nostrils; but cases are recorded in which it has burst forth from the eyes, ears, gums, arms, bladder, nipples, the ends of the fingers and toes, from the joints, the axilla, the stump of an amputated limb, from ulcers, varicose tumors, and from the surface of the skin generally. The attack in these cases comes on suddenly, and continues at intervals for some days, unless the quantity be very great, in which case there is only one hæmorrhage. The local and perhaps constitutional distress under which the patient laboured may have been thus relieved, but her health is not re-established in the interval. Vicarious hæmorrhage, instead of occurring every month, sometimes alternates monthly with the catamenia, and sometimes again it only occurs after long periods, so as to appear quite accidental.

Instead of vicarious hæmorrhage, it sometimes happens, when the patient's health has suffered greatly, that the leucorrhœal discharge has appeared at the regular periods, instead of the menses, and this for many successive periods, greatly adding to the nervous sensibility which so remarkably characterizes this disease, and giving rise to the most exquisite forms of hysteria.

Diagnosis.—The points involved in the diagnosis are, whether the amenorrhœa is the result of pregnancy, or of congenital malformation, and these cases can be readily determined by an examination. It should be remembered that there are endless instances of a woman bearing many children successively without menstruating, the impregnation taking place during lactation. Professor Frank also gives the case of a woman who bore three children, without having menstruated either previously to her marriage or subsequently to the birth of the children.

Prognosis.—Amenorrhœa is itself void of danger, unless it denotes the existence of some disease of a fatal character, as phthisis. At the "turn of life" it is sometimes succeeded by ovarian or uterine disease.

Treatment.—When a sudden suppression of menstruation has taken place, as in acute amenorrhœa, the natural flow is often re-established by placing the patient's feet in warm water, or else by placing her in a warm hip-bath, and exhibiting some diaphoretic medicine or drink at bed-time, when the discharge often returns in a few hours. If, however, it should be accompanied by fever, headache, and a quick pulse, dry skin, and heated tongue, some blood should be taken from the arm; a saline purgative, combined with a mild opiate, should be exhibited ter die, and hot fomentations be applied to the abdomen.

The chronic forms of amenorrhœa are best treated by tonics; and there is no class of medicines which have not maintained much reputation in this complaint, as musk, castor, camphor, or the vegetable and mineral tonics. Dr. Locock speaks of the combination of myrrh, aloes, sulphate of iron, and of the essential oil of savine, as having been highly useful in his practice. (Cyclopædia of Medicine.) In general the amenorrhœa is best treated with salicine, gr. x. ter die, or with preparations of iron, as the citrate of iron, gr. x. ter die, or Griffith's mixture; but the salicine less frequently disappoints the hopes of the practitioner than the iron, and does not heat the patient or cause headache. When the bowels are extremely confined the decoct. aloes ℥ ſs. to ℥ j. ter die may sometimes be substituted for or taken in conjunction with the other medicines. If these remedies should fail, a wide field of experiment is laid open to the practitioner. Dr. Bardesley, for instance, recommends strychnia one-tenth to one-quarter of a grain, a remedy unquestionably of great danger and of little benefit; while others recommend savine, tinct. cantharides ♏xxv. ter die, the turpentines, balsams, or guaiacum. The patient, however, had better repair to some of the natural mineral springs, as Tunbridge Wells or Cheltenham, where she can have wholesome air and exercise, rather than submit to so endless a series of medicamentations.

Dysmenorrhœa, or Hysteralgia,

Is that affection in which the periods of menstruation are attended with great pain.

Remote Causes.—This affection, often constitutional, is common to barren, to epileptic, or to highly hysterical women. It sometimes arises, however, from fright, or other cause which suspends the flow of the menses.

Predisposing Causes.—Dysmenorrhœa is rare before the body has acquired its full growth, and is most common between twenty and thirty-five. It necessarily ceases during pregnancy and suckling, but it returns and marks the few last years of menstruation. It occurs most frequently in women of a nervous sanguine temperament, and of strong passions, and it is said more especially to affect those devoted to a monastic life.

Pathology.—Dysmenorrhœa unquestionably accompanies most structural diseases of the womb, but structural diseases of the womb are rare till after forty. This form of uterine disease, therefore, in the great majority of cases is purely functional.

Symptoms.—Catamenial hysteralgia commences most commonly two, three, or more days before menstruation. The symptoms are lumbar pains, increased by the patient attempting to stand, and also pains of the hypogastrium and umbilicus. These pains have different characters and intensities, and are described as lancinating, or stabbing, or constricted, and as if the abdomen was grasped by a powerful hand. The patient from her sufferings being unable to walk, her digestive functions are generally deranged, and her bowels constipated or otherwise affected. The mammæ also enlarge and are painful, the genital organs are swollen, a mucous discharge takes place from the vagina, the passage of urine is attended with heat, and in some cases both the bladder and rectum sympathize, and are irritable.

These symptoms increase as the period approaches, when they sometimes suddenly cease, but at other times they continue till the menstrual flux decreases, and then are mitigated. The flow is often trifling and so defective in quality and quantity as to be little more than a reddish serosity, or, being abundant, it may suddenly cease and return some days after. In other cases it is profuse, almost amounting to hæmorrhage. In the intervals, in many cases, the patient enjoys good health; in other cases, the pains, though mitigated, are aroused on the slightest motion, while in a very few some inflammation of the uterus, extending perhaps to the ovaries, may take place.

Diagnosis.—The coincidence of the attack with the periodic flow, and its subsidence after its cessation, are sufficient diagnostic symptoms of this affection.

Prognosis.—The symptoms of hysteralgia are sometimes so intense as to alarm and distress both the patient and her family, but life is never compromised, and the prognosis is consequently always favourable.

Treatment.—There are few diseases more distressing to the patient than hysteralgia, or that are altogether less under the control of medicine. During the period, however, a warm hip-bath, an opiate, and the mist. camphoræ c. sp. ætheris nitrici often afford great relief, and in recent cases of great severity some blood may be taken by cupping from the loins. In the interval the pains, it has been stated, are often mitigated, but nevertheless they are still often reproduced by every attempt to walk, and the patient is perhaps for many months confined to the sofa. Under these circumstances experience has shown that bleeding is not only of no use, but that, for the most part, it is absolutely injurious; neither do blisters produce any satisfactory results. We have, however, some resource in stimulant medicines, as camphor gr. v. to x. ter die; in the mistura assafœtidæ ʒ ſs. to ʒ j. ter die; also in salicine, iron, castor, musk, warm purgatives, and quina; and all these perhaps give relief in turn, but all at length perhaps equally fail, showing that they act rather on the mind than on the body. From this cause we should recommend change of scene, of air, and of society, together with cold bathing in the morning during the intervals, and warm baths at the particular periods. Such exercise, also, on horseback as the patient can take she should be permitted to indulge in, and her mind should be amused in every possible manner. At length these miseries subside or are suspended by marriage, pregnancy, suckling, or the approach of the "time of life." The worst cases are those which are connected with disease of the heart or with epilepsy, and in these instances no permanent relief is obtained unless the primary disease subsides.

OF HÆMORRHAGES.—ORDER II.

Hæmorrhage is the effusion of blood into the substance of an organ, or else from some tissue of the body, and more especially from the cellular and mucous tissues. It may take place from the rupture of a blood-vessel, whether caused by a simple solution of continuity, or by an abscess or other form of ulcer. More commonly, however, hæmorrhage takes place from the capillary vessels of the part, without any rupture of vessel or breach of surface, and this latter form is that which occurs in ninety-nine cases in a hundred. The blood effused may be either venous or arterial, and the symptoms it gives rise to depend on the organ affected and the quantity of blood lost.

Hæmorrhage may be caused by a diseased action of the solids, and in this case it may be active or passive. It is passive, for instance, when it takes place in consequence of a blow which impairs the vitality of the part and allows the escape of blood into the surrounding tissues. It is passive also when the heart acts so powerfully as to overcome the capillaries of the part. There are many circumstances, however, in which it is evidently active, as in menstruation, in vicarious hæmorrhage, in some cases of inflammation, and also in many of those cases in which it is the prelude to phthisis. There are a certain number of hæmorrhages also which do not appear to originate in a primary diseased action of the solids, but which seem to result from an altered condition of the blood. Thus hæmorrhages are common when the blood contains less fibrine than in health, as in typhus and in scurvy, while they are rare in diseases in which the blood contains an excess of fibrine, as in inflammation or chlorosis. This diminution of fibrine in cases of hæmorrhage is so constant that Andral conceives it impossible not to regard the one as the cause of the other. In hæmorrhage from plethora he conceives that the fibrine remaining the same, or being diminished, the blood contains a larger proportion of red globules than in health; while in scurvy, or other depressed states of the system, the fibrine is alone diminished, the red globules remaining in normal proportion. In general, in hæmorrhage, the blood is not buffed, has a large soft clot, and if the hæmorrhage has been considerable, with difficulty coagulates, showing a diminished quantity of fibrine. Many substances also which directly contaminate the blood have the power to produce hæmorrhage. A solution of sub-carbonate of soda, injected into the veins of animals, deprives the blood entirely of the power of coagulating, and the absorption of the muriate of soda is probably the cause of scurvy. Many morbid poisons, also, as that of typhus fever or of small-pox, also have a similar tendency. Hæmorrhage, therefore, may be caused by an altered state of the blood as well as by a diseased condition of the solids, and in many instances, perhaps, is referable to both causes. One of the most general laws of hæmorrhage, according to Gendrin, is, that when blood is effused into the substance of an organ, as the brain, it is never absorbed without the process of inflammation being set up.

APOPLEXIA

Is the effusion of blood within the cavity of the cranium, causing the patient suddenly to fall down, deprived on the instant of all sense and motion. This disease was well known in the Greek and Roman schools of medicine, and is of too frequent occurrence and of too striking a character to have escaped observation even in the rudest ages of society. In the year 1839, 5293 persons died of apoplexy, and 4910 of paralysis, probably in consequence of apoplexy, in England and Wales, thus giving one death in thirty-three from this cause in our own country.

Remote Cause.—Among the most frequent causes of apoplexy is an intemperate use of fermented liquors, a class of substances which not only powerfully excites and powerfully depresses the action of the brain, but also acts specifically on the heart and arteries, causing not only temporary energetic action of those parts, but also organic alterations in their structure. In the latter case the powers of the heart are often permanently augmented, while the coats of the arteries, thickened and thinned, or ulcerated, have their elasticity destroyed, and the tendency to hæmorrhage of the brain increased. The excessive use of narcotics, as opium or tobacco, is also supposed to predispose to congestion of the brain, and consequently to cerebral hæmorrhage. The bon-vivant, the indolent, and the sedentary person is the most frequent victim of this disease, from his usually plethoric habit.

Extremes of temperature, also, are powerful predisponents to apoplexy; for in summer the fluids are expanded and the tone of the capillaries impaired, while in winter the cold drives the blood from the periphery of the body to its central organs, and consequently to the brain. Sudden and great vicissitudes of the weather, as they rapidly exhaust the nervous power, are more frequently fatal than the uniform continuance of its extremes, and these have been considered, on more than one occasion, as the cause of apoplexy prevailing to such an extent at Edinburgh and Rome as to be almost endemic.

The greater number of deaths from apoplexy in France, says Gendrin, during the last half century, has shown the powerful effects of *moral causes* in producing this fatal disorder. No times were ever more fruitful in conjunctions calculated to excite the passions and to rouse the moral feelings. Fortunes were broken, the bonds of relationship destroyed,—the cares of envy and of intrigue, the wounds of calumny, the dreams of ambition, the activity of political hatred, weighing still more heavily on the oppressor than on the oppressed, were all in their fullest activity, unchecked by any true principle of religion or of sound philosophy.

Mechanical obstruction is also a frequent occasion of apoplexy. If an obstacle, for example, be opposed to the course of the blood, as when the valves of the heart are diseased, the blood accumulates in the capillary system generally, and consequently in the brain. Apoplexy is still more common when the aorta is diseased, the force of the heart, unchecked by the elasticity of that vessel, acting directly on the brain, so that its vessels often give way from this cause. Mechanical violence, also, often produces apoplectic effusion. Thus a concussion of the brain always produces temporary congestion of that organ, while, if severe, effusion may take place behind the dura mater, or between the membranes, as well as into the substance of the brain, which may be extensively ruptured. A workman fell into a well, fractured both his legs, and died two hours afterwards. In this case a large apoplectic *foyer*, filled with blood, existed in the brain, which had so lacerated its substance that both the lateral ventricles communicated.

Predisposing Causes.—Apoplexy occurs even in some few instances in childhood. Billard gives the case of a child that died apoplectic at three days old from effusion into the left hemisphere and about the lateral parts of the corpora striata. Serres also saw a similar case in a child three months old. Apoplexy, however, is extremely rare till puberty, and only a few cases are met with before twenty. It is not unfrequent between thirty and fifty, while after fifty it is one of the most frequent causes of death. There are many circumstances which favour the occurrence of apoplexy in old age. At that period the capillary system becomes in part obliterated in all organs, and thus the veins are filled with a greater quantity of blood, or become congested. The cerebral arteries also are often diseased; the heart also has frequently acquired an abnormal power, driving the blood with great violence towards the brain, while the lungs have their functions impaired, so that the blood is only imperfectly oxygenated; and all these are causes of congestion and of tendency to rupture of the vessels of the brain.

Both sexes are liable to this affection, and in nearly equal proportion; the number of deaths in the male population of this country in 1839 being 2809, and of the female portion 2484. The party most liable to attack is florid in complexion, short in the neck, prominent in the eye, broad in the chest, protuberant in the belly, and loaded with fat, and sometimes enormously so. Many thin persons, with spare long necks, however, frequently fall from apoplexy, but it is probable in these cases that their heart, or large vessels, must be diseased. As form descends, a large number of apoplexies appear to be hereditary, and many successive generations fall from this complaint. It is common also in families.

The act of digestion appears to predispose to apoplexy, for numbers are attacked after dinner. Sleep, also, which many physiologists suppose to be caused by a temporary congestion of the vessels of the brain, is another predisposing circumstance. Thus of 176 cases examined by Gendrin, 97 had been attacked during sleep.

Many diseases also predispose to apoplexy, as mania, epilepsy, also suppressed hæmorrhoids, amenorrhœa, and especially the "turn of life," and probably from the plethora they induce.

Pathology.—Some very few cases have died from apoplexy when nothing has been found but congestion of the vessels of the scalp, of the membranes of the brain, and of the brain itself, but without the extravasation of a particle of blood, so that the party has fallen from mere pressure on the brain, caused by the apoplectic orgasm. The rule, however, in apoplexy, is, that a greater or less quantity of blood is effused either into the cavity of the arachnoid, or else into the substance of the brain, or into both in every case. When the quantity is trifling, the disease is seldom fatal on the first attack, so that in examining apoplectic cases it is not unusual to find a cavity scarcely bigger than an oat in the substance of the brain, the evidence of the primary attack, and containing perhaps a dry clot of blood. On the contrary, if the blood be effused among the membranes, it may be altogether absorbed, and not a trace of disease be found. In severe cases, still greater quantities of blood are effused, while, if the apoplexy be "foudroyante," and destroy the patient in a few minutes or a few hours, the quantity of blood effused will sometimes fill the whole cavity of the arachnoid, or extensively rupture the substance of the brain, forming a cavity as large as a nut or an egg, or even lay the ventricles one into the other.

It is rare that sanguineous effusion occupies both cerebral lobes, or the whole extent of the membranes of the brain, although such instances are occasionally seen. More commonly it is limited to the substance of one hemisphere, or to the membranes covering it. When the membranes of the brain are affected, the more immediate seat of the hæmorrhage is usually that portion covering the convexity of the brain. This varies, however; and the portion covering the base, or that investing the cerebellum, or indeed any other part, may be its seat.

The superficial membranes of the brain are not the only membranes of that organ which are the seat of apoplectic effusion, for hæmorrhage may take place from the membrane lining the ventricles, and which sometimes bleeds so profusely as not only to fill the lateral ventricles, but even to enlarge their cavities. As death in these severe cases is usually sudden, the walls of the ventricles are generally healthy, but in some very few instances the septum lucidum has been found ruptured, so that the ventricles have communicated. No case, however, is known of a simultaneous effusion into both lateral ventricles. The smaller ventricles are in a very few instances also the seat of apoplectic effusion, Dr. Abercrombie having given a case in which the third and fourth ventricles were filled with blood. This patient was not at first insensible, but gradually became so, and died in a few hours.

The appearance of the blood effused into the membranes of the brain varies according to the time which elapses before the patient dies. If that event takes place in a few hours after the attack, the blood is still fluid, or else is found in black clots, while the membranes, except being infiltrated with blood, are as yet healthy. The substance of the brain, likewise, has no other appearance of disease than being flattened from the pressure of the extravasated blood. If the patient, however, survive a few days, the membranes show marks of inflammatory action, are injected, thickened, and although dry and pitchy in the immediate neighbourhood of the clot, have yet some serum effused in other parts of their cavity. The convolutions of the affected part of the brain are likewise now not only flattened, but softened (ramollie).

When effusion has taken place into the substance of the brain, if the patient has died in the fit, or shortly after, the hæmorrhagic *foyer* is found filled with half-coagulated blood, its walls irregularly softened, and dyed for some lines in thickness with the colouring matter of the blood; and a small stream of water thrown upon this part at once removes the extravasated blood, and also a layer of cerebral matter. Again, if the patient has survived a week, the blood is found coagulated, and the serum set free; but the presence of the clot has caused inflammation, so that the walls of the cavity are not only discoloured but softened, and are softer in proportion as they are nearer the clot. If life be prolonged till the fifteenth day, the serosity is absorbed, but the walls of the cavity are still of a deep red. About the thirtieth day, if the patient live so long, the clot is isolated, and a membrane forms, at first muciform, fragile, intermixed with particles of cerebral matter, and also with some of the colouring matter of the clot. By degrees, this membrane becomes more consistent, the clot diminishes, and some serum is probably secreted by the new membrane surrounding it. The cerebral walls surrounding the cyst, before softened, now become indurated, and are stained yellow from the usual changes which the extravasated blood with which they are penetrated undergoes, a colour however which they ultimately lose. The cavity thus formed is at length, perhaps, filled with nothing but serum, or, the serum being absorbed, the membranous cyst may ossify, and be thus converted into a bony tumor. At other times, the opposite sides of the cavity unite by a kind of cellular membrane, which thus forms a species of cicatrix, but possessing so little power of conducting nervous influence that the patient seldom recovers from his palsy. Such is a short outline of the effects of hæmorrhage into the substance of the brain. The size of an apoplectic *foyer*, it has been stated, varies from an oat to that of an egg, and their number is as variable as their extent. Sometimes we find but one, sometimes two, and in a very few instances three or more. When many *foyers* exist in the brain, it is rare to find them all in the same state, for some are old and almost obliterated, others are fresher, and others again quite recent, their different stages marking a distinct and different period of attack. As to the particular seats of the apoplectic effusion, Andral has collected a series of cases, and found the following to be the order of their frequency:—

Effusion into that part of the cerebral hemispheres situated on a level with the corpora striata and thalami opticorum, and at the same time into those two centres	202
Effusion into the corpora striata	61
Thalami opticorum	35
Portions of the hemispheres situated above the centum ovale	27
Lateral lobes of the cerebellum	16
Before the corpora striata	10
Mesocephalus	9
Spinal cord	8
Behind thalami opticorum, or in the posterior lobes	7
Median lobe of cerebellum	5
Peduncle of the brain	3
Peduncle of the cerebellum	1
Corpora olivaria	1
Pituitary gland	1
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Many pathologists affirm that apoplexy is caused by rupture of the blood-vessels in every case, although they admit this state of parts can rarely be demonstrated, the ruptured vessels being generally less than one-third of a line in diameter, and consequently too small to be manifest to sense. That rupture of vessels is occasionally the cause of cerebral hæmorrhage there can be no doubt, for Rochoux, Abercrombie, and others, have collected instances of the rupture of the larger superficial vessels of the brain, as of the carotid, the basiliary, and of the meningeal arteries, these vessels being either aneurismal, ossified, cartilaginous, or otherwise previously diseased; but even these cases are very rare.

It is certain also that the large encephalic veins are in a very small number of instances found ruptured in apoplexy, as the venous sinuses. As a general rule, however, apoplexy is the result of an hæmorrhagic action or exudation from the coats or mouths of the capillary vessels.

It has been a favourite object with pathologists to connect the lesions of the brain, found after death, with the symptoms during life. But apoplexy has not furnished us with any analysis of the organs of the mind. It has, however, determined one general law with respect to motion, or that the power of volition is crossed, each hemisphere commanding the motions of the limbs of the opposite side. The theory of apoplexy is of considerable difficulty; the quantity of blood effused is often so small that it is impossible to account for the symptoms from mere pressure. It is probable, therefore, that the blood effused is a consequence of an apoplectic orgasm residing in the brain itself. The subsequent palsy of course depends on pressure or other injury done to the brain.

Symptoms.—Encephalic hæmorrhage may take place suddenly, and while the patient is in his best health. More commonly, perhaps, it is preceded for a few hours or a few days by giddiness, by fulness, weight, or severe pain of the head; by deafness, noise in the ears, or by violent palpitation of the heart. In other cases the mind is affected, and the memory or other faculty sensibly impaired; or the patient has a feeling of numbness in his fingers, or is deluded by optical illusions. At length the *fit* of apoplexy takes place, and in one of three degrees of intensity, termed by Rostan *apoplexie faible*, *apoplexie moyenne*, and *apoplexie forte.*

The distinguishing symptom of these different degrees is the mode in which the fit terminates. In the first degree, the patient recovers with the entire use both of his limbs and of his mental faculties. In the second degree, if he is restored, one or more of his limbs are palsied, and his mind more or less impaired; while, in the third degree, he dies in the fit, seldom giving any sign of sense, of motion, or of intelligence.

The symptoms of the first degree, or *coup de sang, ou apoplexie faible, ou fugace*, are that the patient, on the instant of his seizure, suddenly becomes insensible, and if standing, he falls to the ground; or, if sitting, he makes perhaps a convulsive effort to rise; or else his head falls on his chest, as in a deep sleep, but his face is pale or purple, his mouth often drawn, and his eye fixed, with the pupil insensible to light. In whatever position, however, he may be seized, his limbs, when raised, fall by their own gravity; his pulse, though not greatly accelerated, is full, and the carotids are in strong action. His respiration is slow and deep, and the temperature of the head and neck is increased, but that of the extremities diminished.

The duration of the fit in this mild form of the disease is very various, sometimes lasting only a few minutes, and seldom exceeding two or three hours. The first symptoms of recovery are, the nose becoming sensible to irritants, the eye to light, and then succeed a few convulsive movements, a few deep-drawn sighs, and the patient is restored to consciousness; he has, however, no recollection of what has passed; his looks express astonishment, his tongue is swollen, and his replies slow; he remains enfeebled in body and in mind for a few days, but at length recovers, nevertheless often bearing about him, and for a long time, marks of the shock his brain has sustained.

It is rare that the *coup de sang* is not renewed, for more generally it is only the commencement of a series of attacks which ultimately destroy the patient. Popular opinion supposes the patient to suffer three apoplectic attacks, the first being mild, the second followed by paralysis, while the third is fatal. It is only in a few instances that this number is exceeded.

In the second degree of apoplexy, or *apoplexie moyenne, ou paraplexie*, the symptoms of the fit are similar, only more severe and last longer, or perhaps from two to twelve or fourteen hours, and on the patient recovering it is found that many important functions depending on the brain are profoundly and permanently impaired. These lesions are most usually hemiplegia, or palsy of one side of the body, and perhaps of one side of the face or of the tongue. In other cases, however, only one limb, or part of a limb, is affected, as an arm, the fore arm, or a hand; while in others it is only one leg, which, if the attack be mild, the patient is able to move in bed, but if he attempts to walk, it drags, or else, it being too feeble to support the weight of his body, he falls down. In other rare instances the paralysis is crossed, the arm of one side and the leg of the other being affected; or the patient is paralyzed, both arms or both extremities being palsied.

In some cases only one set of muscles is palsied, generally the extensors, so that the leg may be forcibly bent against the buttock, or the fore arm flexed upon the upper arm. Sometimes, however, the extensors are alone affected, so that the knees may be drawn up to the chin.

If the patient survives any length of time he usually recovers some use of his leg, so that he is able to walk with a "straight leg" and a dragging foot; but the use of his arm returns more slowly and more imperfectly. This recovery is often preceded and accompanied by very severe pains, especially of the upper extremity, marking the still irritated state of the brain. The limb, however, uniformly wastes, and its vital powers are so impaired that if inflamed the inflammation seldom terminates by resolution, but has a great tendency to gangrene, while cicatrization is slow and difficult.

The abolition of sensation is complete during the fit, but in general the patient entirely recovers all his senses. In some cases, however, he is affected not only with palsy, but also with anæsthesia, so that you may prick, pinch, or burn the affected limb without giving any pain. In other cases, again, the patient is palsied on one side, and deprived of all sensation on the other; in others the anæsthesia exists without the palsy. In a patient lately in St. Thomas's Hospital, the right arm, without being palsied, was so numbed or affected with anæsthesia after apoplexy, that the party was unconscious of what he held in that hand, and consequently when not looking at it let everything fall. One side of his face was also in a similar state of insensibility. In general the patient recovers the sensations of the part before he acquires the power of moving it, but in other cases the event is reversed, and he recovers the use of the limb although it remains permanently in a state of anæsthesia.

The apoplectic patient in some rare cases labours under amaurosis, or else objects appear to him black and without any determinate form, or he sees only one-half of an object, or else one-half appears of one colour and the other half of a different colour. Deafness is very unusual after apoplexy, but the loss of the senses of smell and of taste are very common.

It is singular that parts struck with anæsthesia do not waste as in palsy, neither are they exempted from the action of many morbid poisons. A patient, for instance, was seized with small-pox while labouring under anæsthesia of the arm, when the diseased limb was equally affected with the sound one. Another affected by anæsthesia of the face, was seized with erysipelas of the face, when he presented the curious fact of suffering much pain on the sound side, but was entirely free from pain on the affected side.

The patient, on recovering from the attack, has sometimes the good fortune to recover all the faculties of his mind, but more commonly his memory is impaired often to such a degree that he has forgotten all dates, the names of his friends, or even the names of things. Broussonet, professor of medicine at Montpellier, had entirely lost the remembrance of all noun substantives; and another case is given in which the patient lost all his adjectives. In some instances the power of association is also so destroyed that although many remember both names and things, they are unable to connect the thing with the proper word, so that they call that which is cold, hot; or speak of night when they mean day; or call a coffee-pot a wash-hand basin. Others, again, have forgotten how to read, and the power thus lost either returns suddenly, or else they are obliged to learn *de novo.*

The attention is also very greatly impaired, and the patient is no longer able to transact business; or if he begins a sentence is unable to finish it, or he repeats the same idea over and over again. The passions also are little under control, for some weep like children; others laugh immoderately, and all are easily terrified, or otherwise easily acted upon.

Nothing is more variable than the time of recovery after a paralytic attack. In a very few instances the patient is restored in a few days, or in a few weeks, or in a few months, but more commonly the lesions of motion as well as of the mind are permanent, or nearly so. In general, however, some slight improvement takes place even in the worst cases, so that the patient recovers some use first of his leg, and then, perhaps, of his arm.

The adverse circumstances attending recovery from apoplexy are, that although the patient appears to be doing well the first few days after the attack, yet towards the close of the first week the brain, irritated by the presence of the clot, inflames and softens, and thus induces another and a fatal attack of apoplexy. Should the patient, however, survive this dangerous period, he may continue to live many months, or years, according to his age; but he is generally at length cut off by a fresh attack of apoplexy, or else his brain ultimately inflames and softens, and he dies in a typhoid state.

The third degree of apoplexy, or *apoplexie forte*, or *foudroyante*, is that in which the patient lies almost without sense or motion, his face purple and swollen, his eye half open, his respiration stertorous, and his extremities cold, although his pulse is often natural. From this state nothing rouses him, or only to some ejaculation indicating uneasiness. The symptoms which have been mentioned show that the eighth pair and the phrenic nerves are affected, and this is generally followed by the symptoms termed "*fumée la pipe*," denoting palsy of the seventh pair, and in this state the patient dies sometimes in a few minutes, and rarely survives more than a few hours.

Diagnosis.—Apoplexy is distinguished from epilepsy by the absence both of convulsions and of foaming at the mouth; and from *ramollissement* of the brain by the suddenness of the attack.

Prognosis.—Apoplexy is always a grave disease, and the more grave in proportion as the respiration is stertorous and the deglutition difficult. When the symptom termed *fumée la pipe* is present recovery is nearly hopeless. Each succeeding attack is more dangerous than the former. The practitioner should be guarded in his prognosis till after the first week or ten days, lest inflammation should come on, or a fresh attack destroy the patient.

Treatment.—The patient, if seen during the fit, should be bled, and bled copiously, in order to relieve the congestion, and also to check, if possible, a further effusion of blood. The quantity taken should be proportioned to the degree of stertor and to the powers of the patient; and sixteen, twenty, and even thirty ounces may be allowed to flow. If the latter quantity is not followed by some degree of consciousness, it may be inferred that the amount of blood effused is considerable, and that the patient in all probability will not recover. Still, perhaps, an additional chance will be given by applying cold to the head, leeches to the temples, and mustard cataplasms to the feet, also by placing a drop or two of croton oil on the tongue, and by throwing up a cathartic enema of castor oil or other medicament, but not one of turpentine, as is commonly done, for the intoxication that produces must be decidedly injurious.

Some persons are disinclined to any considerable bleeding during the fit, considering that the bony structure which contains the brain removes all atmospheric pressure so entirely as to cause that organ at all times to contain an equal quantity of blood. The brain, however, is not a mechanical syphon, but a living machine governed by vital laws; has a space for a very sensible expansion and contraction at each pulsation of the heart, while posthumous examination shows it to contain very different quantities of blood, it being sometimes gorged, and sometimes blanched of blood. These facts distinctly show that it must possess the power of regulating the quantity of blood sent to it; and we ought therefore in a disease of this moment to follow the dictates of a long experience rather than the conclusions of a fallacious reasoning.

After the patient has in some degree revived, and the congestion consequently removed, we may pause for a few hours and allow some time for the absorption of the blood effused; for any very large depletion after that point is gained would rather facilitate extravasation than prevent it. A few hours then having elapsed, the conduct of the practitioner should be guided by the *pain of the head*, which may be taken as a measure of the fulness of the brain, and its tendency to inflammation. If, therefore, there be pain in the head, ten to twelve leeches should be applied from time to time till that symptom is entirely relieved; or, supposing the pulse to be full and strong, and the patient free from headache, yet under these circumstances leeches should be applied to the head to anticipate that re-action which so generally takes place from the fourth to the seventh day.

The further treatment of the case is by moderately purging the patient, both as a means of relieving the head, as also of improving the secretions of the alimentary canal, which are often black and fœtid; and five grains of calomel given as soon as the patient can swallow, and followed up by a black draught, or by sulphate of magnesia ʒj. out of camphor mixture every four or six hours, and continued according to its effects for a greater or less length of time, are, perhaps, the best means we have for promoting the recovery of the patient, and for preventing a relapse. The foregoing prescriptions are recommended on the supposition that the attack has been caused by simple plethora. In many cases, however, it is a consequence of hypertrophy of the heart; and in such cases less blood should be taken, and eight to ten minims of digitalis be added to each dose of the purgative medicine, or the pulv. seminarum iberidis, grs. iij. to v. ter die should be substituted.

All apprehension of a relapse being at an end, the patient is in general most willing to believe that the palsy is a mere local disease, and to submit to any treatment for its removal. The ancients applied actual cautery to the extremities, to the coronal suture, or to the occiput, but without, as it is understood, any beneficial success. The moderns have had recourse to blisters, to friction, to electricity, and to strychnine; but every attempt to act locally on the muscular system may be stated to have failed. In those few cases which are capable of being relieved, and they are but few, the secale cornutum grs. x. ter die has appeared the most efficient remedy.

Dietetic Treatment.—The diet of the patient should, till all apprehension of a relapse is passed, be low, and limited to milk, boiled vegetables, light puddings, and fish; and at no subsequent period ought he to indulge in a full animal diet, or to drink undiluted wines.

Of Epistaxis.

Epistaxis is a hæmorrhage from the mucous membrane of the nose.

Remote Cause.—Everybody knows that a blow, exposure to a high temperature, crying, or any violent muscular exertion, may be a cause of epistaxis. In some cases it is occasioned by worms, while in others it is constitutional. Some morbid poisons also give rise to it, as that of scurvy, fever, and small-pox.

Predisposing Causes.—This disease occasionally occurs in children of three or four years old. Gendrin mentions a family of three children who suffered every five or six days from epistaxis, from the age of eight to fifteen years old. More commonly it attacks adults between fifteen and twenty-five; no age is entirely exempt from it. Women are equally if not more predisposed to this disease than men, and especially when suffering from amenorrhœa. Hoffman conceives epistaxis to be often hereditary, and has seen it run in families.

Pathology.—Epistaxis in an immense majority of cases is merely the result of an hæmorrhagic action from the nasal membrane without any breach of surface. Indeed, if the hæmorrhage, as is often the case, proceeds from a point low down in the nostrils, the blood is seen to exude from the surface of the sound mucous membrane, only slightly injected.

Symptoms.—The attack of epistaxis may be sudden, or it may be preceded by weight or pain in the head; by heat, redness, or itching of the nostril. As soon as the hæmorrhage is established, the blood issues forth generally in drops, and only rarely in a continued stream, and very seldom from both nostrils. The blood effused at length coagulates; and if on the part from which the hæmorrhage proceeds, the flow of blood ceases; if not, it continues to flow externally, or if internally, down the pharynx.

The quantity of blood lost is very various, sometimes only a few drops, more commonly half an ounce to two ounces; while in other cases it may amount to some pounds. The duration of epistaxis is ordinarily short, often only a few seconds or a few minutes, but in a very few cases it lasts from one to two hours, and has been known to last twenty-four hours. In these latter cases the patient is greatly exhausted, blanched, and leucophlegmatic, his legs swell, and his appearance is perfectly chlorotic.

Diagnosis.—The only difficulty in the diagnosis of epistaxis is when the blood escapes posteriorly by the pharynx instead of anteriorly and by the nostrils.

Prognosis.—Nasal hæmorrhage is rarely dangerous; in a few instances, however, it is so copious that the patient is greatly exhausted; still, in general, so far from being dangerous it is favourable to health by dissipating headache, and a tendency to cerebral congestion. It has been observed that persons subject to epistaxis when children, easily contract grave diseases of the chest, as hæmoptysis, pleurisy, peripnuemonia, and even phthisis in youth; while in more advanced age they become subject to hæmorrhoids, rheumatism, or gout.

Treatment.—Slight cases of epistaxis require no treatment, and hardly any attention. In severer cases cold water, applied by a sponge to the nose, putting the hands in a basin of cold water, and perhaps putting the key of the street door down the back is sufficient to arrest it in a few minutes. If the bleeding should continue after these means have been tried, Valsain found that the hæmorrhage often proceeded from a point so near the extremity of the nostril that it could be compressed by the finger; and he mentions having cured in this manner a case of epistaxis which had burst forth every year for four years. If the seat of the hæmorrhage is beyond the reach of the finger, a pledget dipped in some styptic, as a solution of alum, or of the sulphate of zinc, or sulphate of iron, should be passed up the nose. If the hæmorrhage is very great, and the above methods unsuccessful, it is necessary to plug the nose. This is effected by passing up the nostril a bougie to which a double thread is attached; by means of the one a pledget is to be drawn through the mouth into the posterior nostrils, while another pledget is to be drawn up through the nostril. In this manner the anterior and posterior nostrils are equally blocked up, and the blood, unable to escape, coagulates, and the hæmorrhage is stopped. This operation, trifling as it is, always causes headache, and is painful to the patient. The pledgets should be allowed to remain two or three days and then withdrawn, the coagula now beginning to undergo decomposition, and to become offensive. In cases where the tendency to nasal hæmorrhage is great, the mineral acids, as the inf. rosæ c. acidi sulph. dilut. ♏ iij. to ♏ v. should be exhibited, or, perhaps, what is still better, the bitartrate of potash, ʒ ſs. to ʒ j. bis die, and the general health of the patient should likewise be attended to and restored.

The patient's diet should be light, and the quantity of animal food be either diminished, or for a time be abstained from altogether; light French wines should be preferred to port or sherry, and he should avoid any severe study or exercise.

Hæmoptysis, or bronchial Hæmorrhage.

Hæmoptysis is an hæmorrhage from the lungs.

Remote Causes.—Hæmoptysis may proceed from heat or cold, or sudden transitions of temperature, or else from variations of atmospheric pressure, as from ascending a high mountain, or descending in the diving-bell. It may result also from over-exertion, from plethora, from mechanical violence, and from a violent and disturbed state of the passions.

More commonly hæmoptysis is symptomatic, and results from amenorrhœa, from diseased heart, and more especially from phthisis. Pneumonia is also very constantly attended by hæmoptysis, and consequently every morbid poison which produces inflammation of the lung is a cause of hæmoptysis, as the poison of small-pox, of hooping-cough, of the paludal poison, and also of scurvy.

Predisposing Causes.—Schmidtman, in a practice of thirty years, has seen hæmoptysis seven times in infants. Gendrin once saw it in a child eight years old. More generally, however, it is a disease incident to adolescence, and to the earlier part of riper age. Borrieri limits it between twenty-two and thirty-five; but Frank, with more propriety, extends it from sixteen to thirty-six; but it occurs in cases of diseased heart, and also in phthisis at still later periods. The hereditary tendency to hæmoptysis is as incontestible as to that of phthisis.

Pathology.—When the patient falls after an attack of idiopathic hæmoptysis, the bronchial tubes of the affected lung are found more or less filled with fluid or coagulated blood; but in ninety-nine cases out of a hundred the minutest examination is unable to discover the slightest structural lesion, except perhaps some slight congestion of the bronchial mucous membrane. It seems proved, therefore, that hæmoptysis is caused, in the vast majority of cases, by an hæmorrhagic action of the bronchial membrane, and only in a very few rare instances by rupture of a blood-vessel. Even when the hæmoptysis follows the deposition of tubercular matter which has terminated in abscess, still the hemorrhage, with some very rare exceptions, always comes from the bronchial membrane, the tubercular deposit constantly turning the blood-vessels aside, or else obliterating them, so that perhaps not in one case in five hundred does a blood-vessel traverse the abscess, or is in any way exposed to ulceration or to rupture. It is rare that the hæmoptysis takes place from both lungs. The particular seat of hæmoptysis is *supposed* to be the larger bronchi; for if excessive hemorrhage should take place from the smaller bronchi, it is apprehended the patient must die suffocated. Many other diseases besides phthisis, and especially disease of the heart, are found to co-exist with hæmoptysis.

Symptoms.—Hæmoptysis may take place suddenly, or be preceded by a sense of heat or a feeling of weight at the chest, or the patient may suffer pain between the back and shoulders, or may labour under dyspnœa, palpitation, cough, or coldness of the extremities, and these symptoms may last two or three days. At length the party is seized with a fit of coughing, or a tickling of the throat, and then vomits up sometimes arterial but more often venous blood. The quantity is very various, sometimes not more than streaks the sputa, at others a few ounces, or else some pounds, terrifying both the patient and the bystanders by its vast amount. Laënnec says he has seen as much as ten pints thrown up in forty-eight hours, and as much as thirty pints in a fortnight. The effort of coughing also often causes vomiting, so that the blood discharged is frequently mixed with alimentary matters.

If the quantity thrown up be inconsiderable, the patient's previous health is in no degree affected; but if it be large its effects are strongly marked, for the patient feels oppressed at the præcordia, breathes with difficulty, and with a gurgling sound, caused by the air passing through the viscid blood retained in the bronchi; and this is shortly followed by increasing weakness, even to complete prostration. In still severer cases, as the blood flows the patient turns pale, his countenance becomes œdematous and strongly expressive of terror, or else he falls into a complete syncope. In a very few instances the effusion is so sudden and so considerable that the patient dies suffocated.

It is customary for bronchial hæmorrhage, when considerable, to diminish rapidly, so that at the end of some hours only a few rare isolated sputa are spat up, and at considerable intervals. Usually, however, the hæmoptysis recurs after a greater or less length of time, but not perhaps to the extent of the primary attack.

After the patient has lain for a greater or less length of time in this state of depression a re-action takes place. In sthenic persons the appetite becomes increased, they enjoy everything they are allowed to eat, and after some slight febrile action they rapidly recover. In the fatal cases the pulse becomes rapid, the tongue brown and dry, and the patient sinks with every typhoid symptom. In hæmoptysis the resonance of the chest is in general natural, while the stethescopic sounds vary according to the amount of blood retained in the bronchi. In many cases no abnormal sound exists, in others there is some slight mucous rhonchus, which perhaps ultimately becomes tracheal, and denotes the extreme danger in which the patient lies.

Diagnosis.—The only disease which it is important to distinguish from hæmoptysis is hæmatemesis, and the diagnosis between them is difficult, as the contents of the stomach are often rejected in both cases. The stethescope, however, greatly assists in determining the seat of the disease; and, again, blood is generally found in the stools in cases of hæmatemesis, while it is for the most part wanting in hæmoptysis.

Prognosis.—Idiopathic hæmoptysis, the lung being healthy, unless the quantity of blood lost is very considerable, is seldom dangerous. When, however, the heart, the lung, or the spleen is extensively diseased the prognosis is always unfavourable, and in proportion to the amount of blood lost.

Treatment.—In idiopathic hæmoptysis, the lung and other viscera being sound, it is seldom necessary to bleed the patient, for if the quantity of blood thrown up be large that operation is often dangerous, and if small unnecessary. There are a small number of cases, however, in which bleeding may be necessary, as when the pulse suddenly becomes small and frequent without the powers of the patient being greatly depressed, for this symptom is the forerunner of a renewal of the hæmorrhagic orgasm. The medicines most useful in this form of hæmoptysis are the bitartrate of potash ʒj. 6^{tis} vel 4^{tis} horis, and to each dose of which may be added a quarter to half a grain of opium. Other practitioners prefer the mineral acids, as the infusi rosæ c. acid. sulph. dilut. ♏iij. to ♏x. c. tinct. opii ♏iij. to ♏v. 4^{tis} vel 6^{tis}; larger doses of the dilute sulphuric acid have often been tried, but have constantly failed, being either rejected or else acting injuriously on the coats of the stomach. Many practitioners use plumbi acetati, gr. j. to gr. iij. 6^{tis} vel 4^{tis} horis, with half a grain of opium to each dose; and, according to Andral, when the system has long been under the influence of lead, the red globules suffer a great diminution; but, nevertheless, this is certainly a less efficacious medicine than either of the preceding ones. The nitrate of potash has been much used in France, but Gendrin has not found it efficient, or not more so than any other diuretic. The secale cornutum does not appear to possess any power over this disease. The muriate of soda in ʒſs. to ʒj. doses is in estimation with some practitioners on the continent.

When hæmoptysis is connected with amenorrhœa, preparations of iron often succeed when the above remedies have failed. Two grains of the sulphate of iron out of infusi rosæ, with ʒj. to ʒſs. of the sulphate of magnesia ter die, often restores the menstrual secretion, and cures the hæmoptysis. Indeed it is in this form of amenorrhœa that iron is most successful.

When hæmoptysis depends on disease of the heart, cupping from the chest or moderate bleeding from the arm is often efficacious, and always admissible. The medicines should now be the bitartrate of potash or the mineral acids, to which should be added ♏v. to ♏x. of the tinct. digitalis; it is in many cases proper to add ʒſs. to ʒj. of the sp. ætheris nitrici to each dose, to give tone and steadiness to the otherwise rolling action of the heart.

When hæmoptysis is produced by the presence of tubercles in the lungs the case is nearly hopeless. Bleeding only the more surely destroys the patient, and the mineral or vegetable acids, as they have no power to heal the lung, so they are merely palliatives. They are, however, the best we possess, and therefore should be exhibited, combined perhaps with an opiate.

When the hæmoptysis results from a disease of the spleen, the patient is often supported through a first attack by wine and acids, but the hæmoptysis returns and usually destroys the patient.

When hæmoptysis is connected with inflammation, either from a specific or other poison, the treatment will be pointed out under the particular head of such disease.

Dietetic and general Treatment.—The patient should be placed in bed, with his head and shoulders raised; the window should be partly open so as to keep the room cool. Dr. Drake recommends that the air respired should pass through a tube containing ice; but as this experiment does not seem practicable, it is more common to place a bowl of ice immediately before the patient's mouth. Some practitioners have recommended ice to the chest; but this often causes great anxiety and constriction of the chest, and is of doubtful efficacy.

The bed-clothes should be light. The diet should be slops, and these slops cold, and if cooled to a low temperature by ice so much the better.

PULMONARY APOPLEXY

Is an effusion of blood into the cellular substance of the lungs.

Latour appears to have been the first to describe this disease, in his *Hist. Philosop. et Med. des Hæmorrhagies*, t. i. et ii., p. 220. Orleans, 1815; and he gave it the name of *apoplexie pulmonaire*, and the term has been adopted by Laënnec.

Remote Cause.—Pulmonary apoplexy probably results from all those causes to which pathologists have attributed hæmoptysis. The worst cases, however, are generally seen to be connected with extensive disease of the heart. Morton mentions a singular case, in which a nail had made its way in a fit of laughter into the trachea, and produced pulmonary apoplexy. In a recent case at St. Thomas's Hospital, a patient that had scurvy died of pulmonary apoplexy.

Predisposing Causes.—This disease is rare, and has hitherto been observed only in adults.

Pathology.—In pulmonary apoplexy, when the effusion is trifling and the patient survives for some time, an induration at one or more points of the lung, and exactly circumscribed, is found, caused by an incorporation of the infiltrated blood with the tissue of the lung. These indurations may be black, brown, or red, and if scraped with the scalpel a half coagulated blood escapes, while the surrounding tissues are healthy, or only more or less congested. If the patient perfectly recover, either no trace of disease is found, or else the effused blood is absorbed, and the seat of apoplectic effusion, according to Laënnec, is marked only by a linear cicatrix, denoting an antecedent rupture of the cells of the lung. In graver cases, and when life is quickly extinguished, the blood effused into the lung is in considerable quantity, half coagulated, and the pulmonary tissue so broken down that it is impossible to demonstrate its structure, or to assign the limits of the *foyer*. In the worst cases the lung ruptures, and the effused blood escapes into the cavity of the chest. The bronchi, in most cases, also, are more or less loaded with blood.

Symptoms.—The symptoms of pulmonary apoplexy have various degrees, or the effusion may be slight and the patient recover, or it may be extensive and the patient survive some days, or it may be so sudden and considerable as to cause the immediate death of the patient.

The *first degree* of pulmonary apoplexy, it is supposed, can be determined during life; and if so the symptoms must be a sudden difficulty of breathing, some expectoration of blood, some mucous rhonchus, and a total inability for a time to lie down. On percussion of the chest, also, that portion which corresponds to the seat of the disease must return a dull sound. Gendrin is of opinion that blood cannot be effused without causing inflammation; and he conceives, if the patient recovers, pneumonia of little intensity always follows.

In pulmonary apoplexy of the *second degree*, the symptoms which have been described exist, but in a greater degree, so that the patient is more oppressed in his breathing; he is obliged to be supported by pillows, and his head often falls forward, while his face is purple, and his pulse small and frequent; yet, however formidable these symptoms are, life is still capable of co-existing with them for some time. Professor Mahon, of the Faculty of Medicine at Paris, only sunk after some days from apoplexy of the lung, and which had caused rupture, with effusion of blood, into the cavity of the chest. Another case, a woman, is supposed to have lived twelve days after the attack, and on her death the extravasated blood occupied more than one-half the left lung. In a case of excessively enlarged heart, with permanent patency of the aortic valves, the patient survived several days an effusion of blood into both lungs so considerable that they were almost disorganized.

In the *third degree* of pulmonary apoplexy the patient appears to be almost instantaneously destroyed. Dr. Fortussin, a person of strong health, but subject to hæmorrhoids, had suffered from cough with oppressed breathing. After supping off some grapes he went to bed at about half-past eleven, in a chamber next to that in which a patient lay whom Boyer had cut for the stone and confided to his care; at three in the morning the nurse went into the room and found him dead; he lay on his stomach, his left hand on his chest, and his right hand hanging out of bed; while around the bed was much blood that he had thrown up both by the mouth and nose. The body presented a violet tinge from the forehead to below the chest. He had died of apoplexy of the right lung, so considerable that its substance was ruptured in many places, and the right side of the chest filled with blood.

Diagnosis.—Apoplexy of the lung is distinguished from hæmoptysis by the dulness on percussion, by the "souffle tubaire," and by the subsequent fever and pnuemonia.

Prognosis.—Pulmonary apoplexy is always of grave prognosis; but should the patient survive the attack for a few days, and the effusion be inconsiderable and the subsequent inflammation slight, he may recover.

Treatment.—The treatment must of course depend on the disease being primary or symptomatic. When the apoplexy is primary, and the diagnosis can be relied on, bleeding, and perhaps to a considerable extent, together with the mineral acids or super-acid salts, appear to offer the most chances of recovery. If, on the contrary, the apoplexy be secondary, and depends on disease of the heart, the bleeding should be moderate, lest the heart be excited to a still more powerful action, and in this case digitalis, and perhaps some slight narcotic, should be added, to tranquillize that too highly-excited organ.

The *dietetic* and *general treatment* are the same as have been directed for hæmoptysis.

HÆMATEMESIS—GASTROHÆMORRHAGE—

Is a discharge of blood from the stomach.

Remote Cause.—Hæmatemesis may result from all those causes which have been mentioned as producing hæmoptysis, but it may arise also from causes which are peculiar to the stomach, as from the effect of vomiting, or from a blow. Another peculiar cause is ulceration of the gastric artery or vein, vessels which sometimes rupture from the effects of cancer or inflammation. Frank speaks of a girl who suffered from hæmatemesis, in consequence of a small bone sticking in the coats of the stomach. In armies on actual service the thirsty soldier sometimes suffers from this affection, in consequence of drinking incautiously water containing leeches.

Predisposing Causes.—New-born children are sometimes subject to this disease from the day of birth till about twelve days old. Gendrin gives three cases of this kind, although there was nothing unusual in the delivery. Except at this early period hæmatemesis is rare till puberty. Frank, indeed, says he never saw this disease before puberty, nor after sixty. Both sexes are equally liable to it; but women suffer more frequently than men, and especially those who are either pregnant or labour under amenorrhœa.

Pathology.—On opening the stomach of a patient that has died of hæmatemesis blood is found in various degrees of consistency, or from a pure liquid black or brown blood to a solid coagulum. Portions of the blood thus extravasated are also found in the œsophagus and in the intestines. The internal surface of the stomach is almost always coated with a layer of viscid mucus which separates it from the clot. This mucus is necessarily dyed of a red colour. The quantity of blood found is very various. Dr. Elliotson saw a patient fall back and die in a minute or two with blood rushing from his mouth. On opening his stomach that organ was found distended with blood to the utmost, forming a perfect mould of the cavity. In general, the mucous membrane of the stomach is hardly stained with the colouring matter of the blood, but it is congested, and in some few spots ecchymosed—blood being infiltrated into the sub-cellular tissue. On the contrary, the surface of the mucous membrane of the intestines is almost always stained at the depending parts.

The stomach, though generally healthy, is sometimes found diseased, and the hæmatemesis is a consequence of ulceration of an artery or vein. Latour speaks of a girl who died suddenly after some fruitless attempts to vomit, and whose stomach was filled with blood, in consequence of an ulceration which had involved several vessels of the stomach. Cruveilhier gives a similar instance of ulceration of the coronary arteries; and Goëppert of ulceration of the coronary veins of the stomach. The most frequent cause of ulceration of the blood-vessels of the stomach, however, is cancer.

When hæmatemesis is symptomatic the disease found is extremely various. In one case it resulted from a schirrous tumor of the pancreas; in another from an enlarged kidney compressing the aorta; in a third from an aneurism of the cœliac artery, which, obstructing the hepatic and splenic arteries, had caused the greater portion of the blood conveyed by those arteries to pass through the gastric artery, and thus caused congestion of the mucous membrane of the stomach. Frank found in the stomach of a woman, who died of hæmatemesis at Pavia, a clot which weighed five pounds; there was no lesion of the stomach, but the liver was tuberculated and in a state of suppuration. Morgagni gives a case of hæmatemesis, in which the spleen was bigger than the liver, and weighed four pounds and a half, and Barry has given a similar case. Sometimes in symptomatic hæmatemesis the blood thrown up has come from an aneurism of the aorta bursting into the stomach; and Lieutaud gives an instance in which the blood came directly from the liver, which had adhered to the ruptured stomach.

Symptoms.—Hæmatemesis may be acute or chronic, the chronic form being usually termed melæna.

The acute form of hæmatemesis may be sudden in its attack, or may be preceded for a few hours by shivering, heat, weight and oppression at the epigastrium, by nausea, headache, and by pains between the shoulders. The buccal and pharyngeal membranes are also said to be sometimes congested, and the gums swollen. Gendrin likewise esteems a swollen state of the liver or spleen one of the primary symptoms, having observed those phenomena in five or six cases.

At length the hæmatemesis occurs, and a quantity of blood, black, clotted, and mixed with alimentary matters, is thrown up, sometimes streaming both from the nose and mouth. The symptoms which now follow are proportioned to the quantity of blood lost, and are nearly the same as in hæmoptysis. If the quantity be small, the pain in the epigastrium ceases, and the patient is relieved. If larger, the patient is in some degree relieved, but greatly exhausted; while, if the quantity thrown up, as it often is, be so abundant as to half fill a wash-hand basin or a chamber vessel, the patient becomes pale, a cold perspiration runs down his face, he has an overwhelming sense of sinking, and his pulse becomes frequent and weak. There are even instances in which hæmatemesis has proved suddenly fatal; for Frank relates the case of a man, aged sixty, who died suddenly and without any manifest cause, and whose stomach was found filled with an enormous quantity of blood.

It is rare that the attack terminates by one vomiting of blood. In the greater number of cases a few hours have scarcely elapsed than the epigastric and dorsal pains are renewed, the thirst and shivering return, and the vomiting recurs, often perhaps four or five times in the space of two or three days; a sensation, as of a burning liquid in the stomach, often precedes these subsequent attacks.

The symptoms which mark the recovery or else the death of the patient are the same as those which occur in hæmoptysis.

The bowels, which are ordinarily constipated previously to the hæmorrhage, generally become spontaneously open shortly after its occurrence. The stools are at first natural, but quickly become black, semi-liquid, very fœtid, and evidently contain blood mixed with bile and fæces. The abdomen is often meteorised, and the seat of painful colic.

It is supposed that hæmorrhage from the stomach may take place without vomiting, the blood passing into the duodenum, and being ejected by the intestines.

The *colour* of the blood thrown up varies according to the time it has sojourned in the stomach. If poured out rapidly and immediately rejected it is often arterial, but accumulated slowly it is of a blackish brown, and clotted. Sometimes a thin layer of coagulated blood forms, which when thrown up has been mistaken for a portion of the mucous membrane of the stomach.

The chronic form of hæmatemesis is termed *gastromelæna*. In this form of the disease the blood is not poured out pure, but undergoes some change in the capillary system, so that it resembles chocolate or coffee grounds, and is, in fact, a species of black vomit. This affection usually occurs as the last stage of many diseases, especially if the patient be of a broken and worn-out constitution. The quantity thrown up is often large, amounting to a pint or two in the course of the day, and this may last for several days. When the patient falls, which is usually the case, the stomach is found congested, but without other appreciable lesion. Dr. Baillie mentions having met with a few of these cases with no very urgent symptoms, and which ultimately recovered. In this form of hæmatemesis, also, the melænic matters often pass in the stools.

Diagnosis.—The chief difficulty in the diagnosis of hæmatemesis is to distinguish it from hæmoptysis; but the burning heat of the stomach, the black pitchy stools, the absence of cough, and of all the signs furnished by auscultation, sufficiently distinguish it from hæmoptysis. The colour of the blood from the stomach, likewise, is generally black, while that from the lungs is more commonly arterial. The quantity is also in general greater from the former than the latter viscus, although there are many exceptions to this rule. It should be remembered, also, that blood may pass from the nose into the stomach during sleep, or from the gums after lancing. This disease is one of those, also, most easily and most commonly feigned. The matters thrown up in melæna bear no resemblance to the fluids ejected from the lungs.

Prognosis.—Hæmatemesis is devoid of danger when it arises from pregnancy, from amenorrhœa, and from suppressed hæmorrhoids. When, however, it arises from organic disease of the stomach, from disease of the liver, spleen, or heart, it is always of grave import, although perhaps not immediately fatal. When, also, it is the result of the action of a morbid poison, the danger is likewise often imminent. In melæna the case is always dangerous, but some few recover.

Treatment.—The treatment of the acute forms of hæmatemesis is similar in every respect to that of hæmoptysis, or by the bitartrate of potash, or the mineral acids. The great volume of the arteries of the stomach, and their origin almost immediately from the aorta by means of the cœliac artery, are reasons which have been alleged for this affection being but little influenced by general or local bleedings. The vast amount of blood, also, sometimes lost by hæmatemesis render it necessary to support the patient by acid wines much sooner and to a much greater extent than in hæmoptysis. In melæna the only chance for the patient is a liberal support by wine, diet, and medicines, and by opiates to quiet the stomach.

Entero-Hæmorrhage—Intestinal Hæmorrhage—

Is a hæmorrhage from some portion of the mucous membrane of the alimentary canal below the stomach. It may have its seat in the small intestines, or in the large, or in both, but probably never affects the whole length of the canal.

Remote Cause.—Besides the usual general causes acting upon peculiar idiosyncrasy, and also the many secondary causes, as diseases of the liver, spleen, heart, inflammation, carcinoma, or morbid poisons, there appears to be a few causes peculiar to the production of intestinal hæmorrhage, as worms; also the occasional descent of the gut, which now becoming constricted by the sphincter ani often bursts out with profuse hæmorrhage. It is said, also, that hæmorrhage from the bowels was endemic among the workmen in the mines of Anzin, in consequence of the presence of sulphuretted hydrogen.

Predisposing Causes.—Children are very liable to slight hæmorrhage from the bowels while teething, and at other periods of infancy. It is most common, however, in the adult, and at those periods when the party is most exposed to the action of morbid poisons, and also in advanced life, when the heart and the abdominal viscera become the seat of disease.

Pathology.—If the intestinal hæmorrhage be considerable, the mucous membrane is generally blanched and colourless; but, when more moderate, the point of effusion may often be determined by the mucous membrane being congested, and perhaps infiltrated at the affected portion. The mesenteric vessels are also found gorged. When the hæmorrhage takes place in dysentery the intestine is found ulcerated, and the same phenomenon is often seen in similar cases of typhus fever. The heart, liver, or spleen may be diseased, or an aneurismal or other tumor may exist.

Symptoms.—This affection may assume one of two forms, or that in which the blood poured out is pure; and into that in which the blood, acted upon by the capillaries, is poured out black, pitchy, and grumous, when the disease is termed entero-melæna.

The attack of entero-hæmorrhage may be sudden or be preceded by a series of preliminary symptoms, as pain in the back and loins as low down as the sacrum, and even descending down to the thighs. The patient also may suffer from colic pains, from flatulence, loss of appetite, and other symptoms of indigestion, while the bowels, also, may be either constipated or open.

Of hæmorrhage from the small intestines, Gendrin gives an instance (p. 213) of an unmarried woman, aged twenty-four, and ill of phthisis, who having for about a week experienced dull heavy pain in the loins, side, and umbilical region, with colicky pains recurring often in the twenty-four hours, passed four stools of a reddish brown liquid matter, accompanied by such weakness that she twice fainted on going to the *garde-robe*. She complained of deep-seated pain in the abdomen, and died in the course of the night. On examination tubercles were found, as had been suspected, in the lungs, but the intestinal tube was also filled with dark blood (*rouge violet*) mixed with much grumous matters. The blood was found about three feet from the stomach, and filled the rest of the intestinal canal downwards; the intestine was congested for the space of about five feet, but was in every other respect healthy.

Hæmorrhage from the large intestine is not uncommon, and is far from being attended with those grave consequences attached to that from the small intestines, although the quantity discharged is often great. From this part of the intestine the hæmorrhage is often periodical, and a great relief to persons subject to headache. It also frequently accompanies the hæmorrhoidal flux, which, as the parts are supplied by common vessels, is easily understood. There are instances, however, in which the quantity passed is so great that the patient falls into a state of complete oligamy. One man, in consequence of the descent of the gut, passed about half a pint of blood every other day for many weeks together, till he not only became sallow and dropsical, but was unable to move from his bed; still he recovered. From the general innocent tendency of hæmorrhage from these parts, it is of course intended to exclude those cases in which it proceeds from diseased heart, from dysentery, from scurvy, or from typhus, as well also as from organic disease of the intestine itself.

Diagnosis.—The only disease with which entero-hæmorrhage can be confounded is hæmorrhoids, and their diagnosis is rendered certain by an examination.

Prognosis.—Hæmorrhage from the small intestines, although not necessarily fatal, is always an unfavourable symptom. Hæmorrhage from the large intestines, if idiopathic, is of little moment; but if it be symptomatic, and results from disease of the heart or spleen, from dysentery, or from organic disease of the intestine itself, the prognosis is grave in proportion to the intractable nature of the primary affection.

Treatment.—Idiopathic intestinal hæmorrhage is in all cases best treated by the bitartrate of potash combined with opium, or else by the mineral acids with the same combination. When it depends, however, on descent of the gut, that part should be mechanically supported by a candle or bougie during the act of defæcation; and that this may be practicable the bowels should be kept freely open. If worms should be suspected to be the cause, the oleum terebinthinæ in ʒ ſs. doses presents the most chances of success. The treatment of those hæmorrhages which result from cancer, diseased heart, liver, or spleen, will be mentioned under the head of those disorders.

Hæmorrhoids.—Bleeding Piles.—Blind Piles.

The term hæmorrhoids is applied to certain bleeding tumors which form round the anus and lower portions of the rectum as far as the internal sphincter.

Remote Causes.—Hæmorrhoids are caused by everything that produces plethora of the abdominal vessels. Persons therefore who indulge largely in boiling hot tea or coffee, or who drink to excess of fermented liquors of any kind are liable to this affection. It is remarked also that hæmorrhoids affect those who ride much on horseback, as likewise pregnant women. Perhaps the most frequent cause is habitual constipation.

Predisposing Causes.—In a very few instances hæmorrhoids have been met with in children of six and seven years of age, but twenty to fifty-five is the more common period of life when they occur. Both sexes appear equally subject to them.

Pathology.—The opportunities of examining hæmorrhoidal tumors are frequent, and they are found to be both internal and external. The internal tumors or piles form between the inner sphincter and external edge of the rectum; they consist of a number of small soft hemispherical tumors of four to five lines in diameter, of a violet tint, and formed by an infiltration of blood into the sub-mucous cellular tissue. These tumors may rupture, and much blood escape from them; they also often inflame and become indurated, or else they ulcerate or form small abscesses, which, should they burst and cicatrize, are thus radically cured. The inflammation thus excited may extend to the veins which form the venous plexus of the lower part of the rectum, and these vessels, especially those that are varicose, often become impervious and obliterated. The mucous membrane of the rectum covering these tumors is, by the succession of inflammation and of sanguine infiltration into these tumors, at length rendered so vascular as to bleed on the slightest friction.

The external piles are formed by the action which the sphincter exerts over the tumors thus formed at the edge of the anus, so that at each act of defæcation they become compressed at its orifice, are pressed outwards, and are thus progressively elongated. They at length hang pendulous external to the anus, and by time they become pediculated, hard, and fibrous at their insertion.

When hæmorrhoids are complicated with prolapsus ani, the fibres of the sphincter and of the elevator ani muscles often become atrophied, wasted, and their action impaired.

In the early stages of this affection the blood or lymph effused may be absorbed, and the disease entirely subside. At a more advanced stage some become indurated and of little sensibility, while others again are soft, bleed profusely, are intensely painful, and sometimes rupture or ulcerate. The mucous membrane, which is greatly vascular, is sometimes swollen, sometimes fissured or ulcerated, and these fissures sometimes penetrate so deep as to occasion fistula.

Symptoms. — The hæmorrhoidal tumors produce many unpleasant symptoms, the least of which are a painful teasing action on the patient passing a stool, which is generally hard, constipated, and tinged with blood. Sometimes the hæmorrhoids are so numerous as to fill up the rectum, and should they descend so as to be grasped by the sphincter the pain is often exquisite, and the patient obliged to return the part with his finger.

When inflammation attacks the hæmorrhoidal tumors the pain is often so severe as to extend to the perinæum and testicles in the male, and to the vagina, uterus, and bladder in the female. These pains are much augmented on every motion, even by lifting up the leg, turning in bed, by sneezing or by coughing. In the worst cases every attempt at defæcation is distressing, and dreaded by the patient. Even sleep is at last almost lost, and a grave dysuria often still further adds to the torment of the patient.

The quantity of blood lost is sometimes trifling, but in severe cases it often amounts to many ounces daily. In the former instance the patient suffers little except from the local irritation; but in the latter he loses flesh, becomes exceedingly nervous, and often sinks into a state of melancholy which renders life a burthen.

Diagnosis.—The existence of piles, except they are excessively high in the gut, can always be determined by an examination.

Prognosis.—Piles have seldom any dangerous tendency unless they cause fistula; when operated on they have been known to produce accidents which have terminated fatally.

Treatment.—The medical treatment of hæmorrhoids consists in a few leeches to the margin of the anus, and in the exhibition of the bitartrate of potash so as to keep the bowels gently relaxed. Sulphur has been much insisted on in these cases, but Heberden says it has no greater virtue than any other laxative; Ward's paste has also much reputation.

The diet should be light, and the patient limited to

French and Rhenish wines. It is more important, however, to induce him to abandon hot tea, or coffee, and soups. Perhaps hæmorrhoids would be little known if we drank only cold water. Ablution with cold water should be practised morning and evening; and some persons are sufficiently sthenic even to bear an injection of cold water, but much caution is necessary in the application of this remedy. If the disease resists these remedies the case becomes surgical.

Of Apoplexy of the Liver and of the Spleen.

The liver and the spleen are occasionally the seat of apoplectic effusion into their substance, and may occasion the instant death of the party, or else the disease may become chronic; but even in this latter case the patient falls ultimately, the constitution apparently being unable to restore the parts to their healthy state. The morbid phenomena differ little from what has been described as occurring in pulmonary apoplexy, and these diseases are too rare to render them interesting to the general reader.

Of Hæmaturia.

All those hæmorrhages in which blood is mixed with the urine, whether it proceed from the kidney, ureter, or bladder, are termed hæmaturia.

Remote Cause.—The usual causes of hæmorrhage all act in producing hæmaturia, hut there are others peculiar to this disease, as blows on the back or loins, the existence of renal or vesical calculi; also granular degeneration of the kidney, diseases of the bladder, and some morbid poisons, as that of the small-pox or of the scurvy: cantharides and the turpentines are said to act specifically in the production of hæmaturia. A remarkable instance of the effects of the high rarefication of the air in causing this affection is, that one gentleman is said to have been seized with hæmaturia while ascending Mont Blanc.

Predisposing Causes.—Children seldom suffer from this affection; a girl, however, about ten years old, is now in St. Thomas's Hospital labouring under it. It is said to be more frequent among men than women; In either sex, however, it is rare, for Frank states that he saw but six cases out of 4000 patients treated at Pavia, and only one case out of 1913, which he treated in seven years at Vienna.

Pathology.—Hæmaturia is frequently so purely a functional disease that we are often unable to trace whether the blood has flowed from the kidney, ureter, or bladder. In some cases, however, when the hæmorrhage has taken place from the kidney a small clot remains to mark the seat of the disease; also, when it proceeds from the bladder, the coats of that viscus, though often pale, are in a few instances red, congested, and some blood exudes from them on pressure. The most usual organic diseases with which hæmaturia is complicated are, Bright's kidney, fungus hæmatodes either of the kidney or bladder, nephritic and vesical calculi, and cancer of the bladder.

Symptoms.—The hæmaturia may take place suddenly, or it may be preceded for a short time by pains in the loins, epigastrium, or bladder. When the hæmaturia is established the patient suffers a burning pain on passing his urine, which contains more or less blood. Sometimes the blood is deposited in clots in the bottom of the vessel, but more frequently it throws down small portions of fibrine like the sediment from beef tea. In grave cases, especially in old persons with disease of the prostate, the blood may coagulate in the bladder and render it both necessary and difficult to pass the catheter.

The hæmaturia often continues for many days, and even weeks together, and the quantity of blood passed, though often trifling, yet occasionally amounts to some ounces in the course of the twenty-four hours. The general symptoms depend, as in other hæmorrhages, on the quantity of blood lost, but, in general, the termination is a return to health. In other cases, however, the patient sinks with all his faculties about him, and in a still smaller number the fatal catastrophe is preceded by a comatose or typhoid state.

Diagnosis.—No certain symptom has yet been observed by which we can determine the particular seat of the hæmorrhage. We should be careful not to confound urine greatly loaded with uric acid with hæmaturia.

Prognosis.—Idiopathic hæmaturia is rarely a grave disease, except it arises from disease of the kidney, or carcinoma, or other structural disease of the urinary organs, when it is the precursor of a fatal event.

Treatment.—Idiopathic hæmorrhage often readily yields to the bitartrate of potash or to the mineral acids; two cases have lately been cured in St. Thomas's Hospital by the former remedy. Dr. Elliotson recommends the ol. terebinthinæ; other writers recommend injections of cold water, or of water in which twenty to forty grains of alum have been dissolved, into the bladder or up the rectum, and also a cold hip-bath. No remedy has yet been discovered for this complaint when it depends on structural disease of the kidney or bladder. In Bright's kidney, however, Dr. Christison recommends bleeding.

Urethral Hæmorrhage

Is a flux of blood from the urethra.

Hæmorrhage from the urethra is common in a slight degree from an accidental blow or other violence, as the passing a bougie, but it is seldom seen as an idiopathic disease. The following case is all that perhaps is necessary to exemplify this subject.

A man, aged fifty-eight, addicted to the indulgences of the table, and who had taken long walks for five or six successive days in the month of July, was seized with dull pains of the loins, sacrum, groin, and upper part of the thighs, which he considered to be rheumatic. About three days afterwards, on passing his urine he felt a sensation of heat along the urethra, which was followed by some drops of blood, and he bled likewise during the night, but to no great extent. The next day he bled for two hours from the urethra, and lost many ounces of blood. Venesection was now performed, and he was afterwards placed in a cold hip-bath, and the bleeding was thus stopped. The next day, however, the hæmorrhage returned, but was again stopped by the same remedies.

Hoffman and other writers speak of hæmorrhage from the urethra returning periodically after the cessation of a hæmorrhoidal flux.

Of Menorrhagia.

In menstruation the mean quantity lost, as has been stated, is about four ounces, and the time that this discharge occupies is from three to four days, so that the party loses rather more than an ounce a-day. When the menstrual discharge exceeds eight ounces in the

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whole period, the quantity is considered abnormal, and the patient is said to labour under menorrhagia. Also if the quantity be natural, but is repeated two or three times within the period, the patient is equally said to labour under menorrhagia.

Remote Causes.—The structure of the uterus is favourable to congestion and to hæmorrhage, for that organ is extremely vascular, and this vascularity is increased when from any cause it acquires an increased volume, as after pregnancy. Extensive venous plexuses, also proper to the neighbouring organs, and especially to the rectum, are connected with the uterus, a circumstance which greatly increases its tendency to become congested. The uterus is likewise fixed to the surrounding parts by loose cellular and other attachments, so that it is easily affected by many shocks and mechanical accidents. As the organ of reproduction, moreover, it is liable to every erotic excitement, and also to abortion, and to the accidents of parturition. Besides these, it is well known that the uterus is powerfully acted upon by every mental emotion, as well as by every ordinary physical cause, so that the exciting causes of menorrhagia are almost endless.

Predisposing Causes.—Lamotte speaks of having seen menorrhagia in a child seven years old. It is, however, a disease proper to adult age, and is most common between twenty-five and forty-five. It rarely occurs after the cessation of the menses, unless the uterus be affected with cancer or other structural disease.

Pathology.—In a large majority of cases menorrhagia occurs without any structural disease of the uterus whatever. The only change is, that the neck and orifice of the uterus are tumefied and softened, but pressure causes no pain. The orifice of the uterus is likewise open, and gives issue to the discharge; and the axis of the uterus slightly deviates forward or to the right. Hæmorrhage of course often exists with every structural disease of the uterus.

Symptoms.—This hæmorrhage may be sudden, but more generally it is preceded by pains in the loins and hypogastrium, aggravated by standing or walking. The patient also often suffers from a vague uneasiness, headache, flushes of the face, abdominal colic, and sometimes diarrhœa; and these symptoms do not subside on the occurrence of the menorrhagia. The hæmorrhage, if abundant, proceeds sometimes without interruption, while in other cases it occurs only at intervals, which are renewed many times in the course of the day.

The quantity of blood lost is very various, sometimes only a few ounces, while in other cases it pours from the vagina with frightful rapidity. The quality of the blood also varies greatly from the healthy secretion in its proportions of serum, of cruor, and of fibrine. In many instances it is so rich in fibrine as to coagulate in clots. In ordinary cases it scarcely coagulates, even in the vagina, and is often only slightly coloured, and these forms often alternate.

The duration of the disease is also very various; when profuse, the hæmorrhage generally begins to diminish in two or three days, and then becomes less and less for the next four or five days. Sometimes there is an alternation of increment and of decrement. In these various manners, although menorrhagia often terminates in six or eight days, yet it sometimes lasts many weeks. One of the most frequent varieties of menorrhagia is when, without being excessively profuse, the menses appear every fortnight or three weeks, and it may happen that the relapses may be still more frequent.

There is, perhaps, no example of hæmorrhage from the unimpregnated uterus terminating in death; but when the quantity lost is considerable, and in a short time, the patient is often thrown into a state of debility which lasts for years. In these cases the general symptoms are a puffed leucophlegmatic sallow face, a throbbing heart, a full quick pulse, with the *bruit du diable*, a high state of nervous excitement, and swollen œdematous legs. The local symptoms are throes like labour-pains, caused by the clots which form in the cavity of the uterus.

Diagnosis.—There can be no doubt that the blood in these cases flows from the uterus; and should that organ have descended and be inverted, the phenomena of menstrual hæmorrhage can be demonstrated. An examination will at once determine the seat of this disease. The violent palpitation of the heart will often lead to a belief that that organ is diseased; but the existence of the hæmorrhage, and the general absence of all *bruit*, however, will instantly remove this supposition.

Prognosis.—Menorrhagia, from a healthy woman, is never of grave prognosis. If profuse, however, there is danger of its laying the foundation of phthisis, or of other severe disease. Even when it results from cancer or polypus, or other disease of the uterus, the patient rarely falls from mere loss of blood.

Treatment.—It seldom happens, when the patient has the ordinary comforts of life, and submits to a proper dietetic treatment, that menorrhagia resists ʒ j. of the bitartrate of potash every four or six hours, combined, perhaps, with half a grain of opium to each dose. The mineral acids are, perhaps, in many cases equally beneficial. The secale cornutum, by causing contraction, is certainly useful in the hæmorrhage which takes place during parturition; but the unimpregnated uterus is in a state of contraction, and the exhibition of this medicine therefore has very generally failed in cases of ordinary menorrhagia. Gendrin says he has often seen it exhibited in the hospitals in Paris in simple menorrhagia, not only without advantage, but with a manifest exasperation of the disease: "il nous a paru évident que les accidents ont été exasperés." In very obstinate dangerous cases dry cupping, a cold lavement, ice to the vulva, and compresses steeped in a solution of alum and passed up the vagina are strongly recommended.

In very chronic cases some tonic remedy should be combined with the bitartrate or the mineral acids, as the sp. ætheris nitrici ʒ j. Other practitioners, however, prefer some preparation of iron, or kino, or even of quina.

The general and dietetic treatment consists in keeping the patient quiet, placing her on a hard cool bed in a well-aired room. All the fluids drank should be cold; but if she should be greatly exhausted or greatly excited, some small portion of wine may be mixed with her drink. No meat should be allowed on any pretext.

Of Dropsies.—Hydrops.—Order III.

Dropsy is the accumulation of a watery fluid in the serous cavities or cellular tissue of the body, constituting a class of diseases which have been treated of in the writings of Hippocrates, and subsequently in those of every school of medicine.

Dropsy may arise from a disordered action of the solids, or from a morbid state of the fluids. Lower appears to have been the first to demonstrate that a diseased liver or diseased heart would, by opposing an obstacle to the circulation, cause dropsy, and for this purpose he tied the vena portarum of a living dog, when the animal fell into dropsy. Dropsy, however, often exists when no obstruction can be discovered, and is evidently owing to a change in the vital affinities of the capillaries, either from mere disordered function, or else from a low inflammatory action. Besides alterations of the solids, dropsy may result from a diseased state of the fluids, and more especially when the albumen or red globules are greatly deficient; thus, in chlorosis, or after large bleedings or profuse hæmorrhage, by which the colouring matter of the blood is greatly reduced, the patient often falls into dropsy. Those states of the kidney likewise by which the serum of the blood is deprived of its albumen, also for the most part cause dropsy. The extent of the loss thus sustained may be conceived, when Andral states that in sixteen cases of dropsy he found the maximum of albumen to be only forty-eight, while the minimum was reduced as low as four, the healthy proportion being as sixty-seven. If the aqueous portion be from any cause sensibly increased, dropsy appears to be the result. Majendie, for instance, injected large portions of aqueous fluids into the veins of an animal which immediately became dropsical in all its cavities. Whatever consequently causes the suppression of a copious secretion from any membrane may be a cause of dropsy. Thus exposure to cold and wet is a very common cause; and to show that in these cases it most probably arises from suppressed perspiration, a man was varnished all over, when he is said to have fallen into dropsy. Dropsy also, it will be seen, often results from a morbid state of the fluids as from their combining with a morbid poison, as with the paludal poison, or with that of scarlet fever. It is evident, therefore, dropsy may arise from a morbid state, either of the solids or fluids, or both. The fluids effused in this disease into the various cavities of the body have been imperfectly analyzed by Dr. Marcet; they have, however, a general resemblance in whatever part of the body they may exist, but vary exceedingly in the proportions of their constituent ingredients. They are as follows:—

In 1000 Grains of Fluid.	Specific Gravity.	Total Solid Contents.	Animal Matter.	Saline Matters.
		Grains.	Grains.	Grains.
Fluid of Spina bifida.	1007·0	11·4	2·2	9·2
,, Hydrocephalus	1006·7	9·2	1·12	8·08
,, Ascites . .	1005·0	33·5	23·1	8·4
,, Ovarian dropsy	1020·2	..	..	8·0
,, Hydrothorax	1012·1	26·6	18·8	7·8
,, Hydrops pericardii . .	1014·3	33·0	25·5	7·5
,, Hydrocele .	1024·3	80·0	71·5	8·5
,, A blister. .	1024·1	..	..	8·1
,, Serum of the blood . .	1029·5	1000·0	90·8	9·2

12,251 cases of this class of disease are reported to have died in England and Wales in 1839, or about one person in twenty-eight.

Hydrocephalus Acutus is an effusion of serous fluid between the membranes of the brain, or else into its ventricles.

Hydrocephalus was very little known till Dr. Whytt published his *Observations on Dropsy of the Brain*, in 1768, but since that period Dr. Fothergill, Dr. Watson, Dr. Dobson, Dr. Cheyne, and a large number of other writers have contributed to illustrate this disease. 7749 patients are said to have died from it in England and Wales in 1839.

Remote Cause.—The remote cause of this affection is often extremely obscure; but exposure to cold or heat, errors in diet, falls or blows on the head, the retrocession of a cutaneous eruption, or an extension of an inflammation of the ear, are among the most common. Disordered function of the liver or alimentary canal is also a frequent cause, and so is dentition, or the presence of worms; and the circumstance of a child being seized in consequence of its feet having by accident been put into a bath of boiling water, will show that any other high irritation will equally produce it. Many morbid poisons also will occasion it, as that of scarlet fever, of pertussis, or of measles; of organic diseases, tubercles of the brain are the most common exciting cause.

Predisposing Causes.—The epochs of infancy and childhood are the most remarkable for predisposing to this disease; for at those periods the rapid growth of the brain, the irritation of dentition, and the great susceptibility of the nervous system generally, are all powerful causes of determination of blood to the head. The greatest number of attacks, according to Percival and Brichtean, occur between the second and the fifth year; or, as a more general law, it occurs from the infant at the breast to twelve years old. Children with large heads and precocious intellects, and more especially those of a scrofulous diathesis, are its most frequent victims. One warning may be learnt from this disease; that it is most common in the children of parents addicted to drunkenness, and from this cause it often runs in families.

Pathology.—There are a few cases in which effusion of serum into the ventricles, or into the cavity of the arachnoid, is unaccompanied by any morbid appearance of the brain or of its membranes whatever, so that hydrocephalus is essentially a mere functional disease. More commonly, however, some lesion of the brain or its membranes does exist; thus the substance of the brain is often marked with more bloody points than usual; the septum lucidum, the fornix, and other parts forming the walls of the ventricles, are often found in a state of softening, sometimes so soft that Golis gives a case in which water could be expressed from it as from a sponge. The membranes also are sometimes found congested, or opaque and thickened, with spots of lymph, evidently the effect of a low inflammation.

The quantity of fluid effused varies from a few teaspoonfuls to seven or eight ounces; and of this the greatest part is generally contained in the lateral ventricles, which from this cause are often so enlarged and distended that the finger placed on the brain immediately over the ventricle is sensible of a distinct fluctuation, while the anterior portion of the fornix is often so raised as to cause a free communication with the third ventricle, and, perhaps, with the fourth, at least the effused fluid is found likewise distending those cavities. The quantity of fluid effused between the membranes is also often great, sometimes filling the whole cavity of the arachnoid as well as the ventricles. Dr. Abercrombie has found serum effused even between the cranium and dura mater, and so also have Bonet and Guding, a circumstance hardly known in any other disease. The choroid plexus or ventricular membrane, although in general pale and healthy, yet sometimes has the intercellular tissue so infiltrated that it is studded with small cysts like a bunch of currants.

The more frequent accidental occurrences are tubercles in the brain or membranes, and some congestion, perhaps, of the mucous membrane of the intestinal canal; but whether the latter is a primary affection or the result of the violent medicines which are generally had recourse to in this affection is not determined. Dr. Joy has remarked that the peculiar green colour of the stools was imparted in the lower portion of the intestine, the fæcal contents of the upper portion being of a pale drab colour, while the bile in the gall-bladder was of a yellow colour.

The pathology of this disease explains no phrenological fact. The child is highly irritable, peevish, and fretful; so if any conclusion is to be drawn, it must be that there is a connexion between the ventricles and the passions.

Symptoms.—Authors have greatly differed as to the nature of this disease, some considering it a mere dropsy, while others have as constantly referred it to an inflammatory origin, but they have generally concurred in dividing it into acute and chronic.

Acute hydrocephalus is divided into three stages; the first stage, according to Dr. Cheyne, being that of increased irritability; the second, that of diminished sensibility; and the third, that of convulsions or palsy.

The first stage may be either sudden in its attack, or be preceded several days by giddiness, so that the child stumbles or falls at play; by a furred tongue, constipated bowels, and, perhaps, offensive breath. At length the senses of sight and of hearing become morbidly acute; he starts at slight noises—complains of intermitting headache—rests his head on his nurse's lap—cries, "Oh! my head, my head!" and then after a time rises up and plays again. As this stage advances the pulse rises, the skin is hot and dry, the urine scanty, the stomach irritable, the bowels constipated, perhaps painful, the stools black and offensive, while the brow is knit, and the pupil of the eye contracted or expanded. The most remarkable feature, however, is a great fretfulness of temper, so that the child is not merely pettish, but quarrelsome. If he sleeps his sleep is short, uneasy, moaning; he also grinds his teeth, rolls his head, and when he wakes up it is with a scream. To sum up the phenomena of this stage in the language of Dr. Cheyne, "We are led to suspect some deeply-seated evil from the frantic screams and complaints of the head and belly, alternating with stupor, or rather lowness, and unwillingness to be roused."

The second stage commences when effusion has taken place; and now the pulse, instead of being rapid, is as slow, perhaps slower than natural, but this is chiefly when the patient is in a horizontal position, for if he attempts to sit up it again becomes rapid; the sickness is also abated; nevertheless the child lies in a state of stupor and of great unwillingness to be moved, with his eyes half-closed, dull and heavy, or else staring or squinting, the pupil being still contracted or expanded, and he often suffers from double vision. The stupor, however, is still interrupted by exclamations or shrill piercing screams, while the tremulous hand of the little sufferer is incessantly engaged in picking his nose or mouth.

In the third stage the patient either sinks or else recovers. If the event is unfavourable the pulse again rises, the eye becomes red and dim, and the child, delirious, is often attacked by partial or general convulsions, or else one limb or one side may be palsied. From this point the powers of life gradually sink, till at last death closes the affecting scene. If the patient should fortunately recover, the stupor subsides, the countenance becomes more natural, the bowels more regular, the secretion of urine perfectly restored, and at length his health, though long broken, is gradually re-established.

The duration of this disease is estimated at about three weeks, each stage averaging about a week.

Diagnosis.—Hydrocephalus is distinguished from typhus by the screaming, rolling of the head, grinding of the teeth, and by the absence of the peculiar tongue which marks the latter disease.

Prognosis.—The chances of recovery in the first stage are very many if the patient be properly treated. At any subsequent period the prognosis is most unfavourable, and Dr. Cheyne estimates the loss of confirmed hydrocephalus at six to one, and perhaps this is near the truth.

Treatment.—This disease is only successfully combated in the first stage; and the first thing to be done is to purge the patient. The purgative is not of great moment, provided it acts freely. Some prefer gamboge, grs. v. 6^{us}; others, calomel grs. ij. to grs. v., with jalap or scammony grs. x. to grs. xv., or the same quantity of the extracti colocynthidis comp.; and this dose is to be followed up by a black draught, or the sulphate of magnesiæ. The stools are generally black, or extremely offensive; and this state of the bowels corrected, the disease, if sympathetic, often ceases. If, however, the head be not relieved, some leeches should be applied to the temples, and the head should be shaved and surrounded with some cold evaporating wash, as with a towel dipped in cold spring water, or in vinegar and water, &c.

If the disease be further advanced, no efficient treatment has as yet been determined. Many practitioners have attempted the cure by copious bleedings, but the symptoms do not yield to the lancet like those of simple inflammation. Mercury has also been used to a great extent, but with little success. In urgent cases, for instance, mercury has been rubbed on the back and thighs, even in very young children, to the extent of half a drachm to ʒ j. three or four times in the twenty-four hours. Calomel also has been rubbed on the gums to the extent of three or four grains every four or five hours; and it has likewise been given by the mouth in doses of two grains every third or fourth hour. Mercury given in these large doses, it must be remarked, seldom produces salivation; for Dr. Clarke says he never saw that effect in children under three years of age, except in three cases; but it is not successful, and more generally produces *spinage* stools, irritates the alimentary canal, and perhaps does harm. In France the mercurial treatment has been so unsuccessful that some practitioners have even tried a most opposite remedy, or quina, but the result has been equally fatal. Blisters, moxas, and other modes of cauterization have been used as auxiliary treatment, but without apparent benefit.

Dietetic Treatment.—During the whole course of this disease the treatment should be slops and light puddings.

Hydrocephalus Chronicus.—This affection may be congenital, caused by some disease or else defective development of the brain during fœtal life, or it may occur at some period in after-life as an original disease.

Remote Cause.—The remote causes are little understood, but as far as they are known they are similar to those producing hydrocephalus acutus.

Predisposing Causes.—This disease, it has been stated, may occur during fœtal life, but is more common in the early periods of infancy and childhood. Adult age is not altogether free from it, and Golis has mentioned three cases of persons attacked in old age, two of whom were above seventy, while the other, perhaps less advanced in life, suffered from this affection for ten years. It seems sometimes to run in families; at least Frank mentions a family of seven children, all of whom were born with this disease; and Golis, another, in which six children were aborted hydrocephalic at six months; while three others, born at the full period, were attacked shortly after birth. The sexes appear to be equally liable to it, or nearly so, as 4313 males and 3436 females died of it in 1839.

Pathology.—The first thing that strikes us on examining these patients is the enormous *size* of the head. The adult head averages about twenty-two inches in circumference; but there was in St. Thomas's Hospital a child, Elizabeth Phillips, whose head measured, at eleven months old, twenty-seven inches and five-eighths; while Dr. Bacon* gives the case of a child whose head at three months had attained the enormous size of twenty-nine inches in circumference. The head of Cardinal, also a celebrated hydrocephalic man, long in St. Thomas's Hospital, and who afterwards died at Guy's, measured thirty-three inches and a half. There are instances, however, in which the cranium has been found unusually small, and of a conical shape, the sutures being closed before birth, and in this case the child is still-born, or dies shortly after delivery. When the disease comes on at later periods of life, and after the sutures are closed, the size of the skull is natural.

The *form* of the hydrocephalic head is also sometimes very irregular, one side being much larger than the other, while the base of the orbits is for the most part convex instead of concave, thrusting the eye unnaturally forwards. On cutting through the skull the bones are found to be remarkably thin and transparent. The sutures also, although generally closed towards the base of the skull, are commonly separated from each other by a wide extent of membrane at their superior portions. If, however, the patient should survive for several years, the membranous portion becomes ossified by a number of points forming "ossa wormiana," and the sutures are thus partially closed. In some very few instances the sutures not only close, but the bones of the skull have a morbid thickness, which thick and large skulls, Dr. Joy conceives, on being dug up have been mistaken for those of giants.

The membranes of the brain are generally thickened, and the water found effused either into the cavity of the arachnoid, into a cyst, or into the ventricles of the brain. When the water is contained within the cavity of the arachnoid, the brain is sometimes so compressed that there are instances in which hardly a vestige of that organ remains. A singular and rare variety of this affection is, that the arachnoid sometimes protrudes through the fontanelle or open suture, and the dura mater and integuments yielding, a pyramidal bag with its apex downwards forms externally, which hangs low down the back like a jelly-bag.

When the effused fluid is contained in the ventricles, those cavities are found exceedingly dilated. The convolutions have no depressions, but appear unfolded. The corpus callosum is much raised, the septum lucidum is torn and destroyed, so that the ventricles communicate. The parts at the base of the brain also, as the corpora striata and thalami opticorum, have scarcely any existence. In fact, the brain seems expanded into a large sac, in which the medullary and cortical substance are so confounded as to be undistinguishable. In Dr. Bacon's case the brain and membranes, even the dura mater, had ruptured, and a probe passed easily through the ethmoid bone into the nose, by whose orifices a considerable dribbling of the fluid took place during life. Golis met with a case in which the water was contained in a cyst the size of a goose's egg, situated between the hemispheres of the brain of a child aged six years, and who died, the cyst being entire.

The quantity of fluid contained in the cranium in hydrocephalus chronicus varies from a few ounces to a few pounds. In the case of Cardinal it was found to exceed ten pints, or nine pints in the cavity of the arachnoid and one pint in the ventricles. Other cases have been, however, recorded in which the quantity has amounted to twenty pints.

Symptoms.—There are two forms of chronic hydrocephalus, the internal and the external or jelly-bag hydrocephalus. In either case, when this disease is fully formed, whether it be congenital or subsequent to birth, the child is generally of most feeble intellect, irascible, often epileptic, and of extreme muscular debility, so that if not palsied he is hardly able to walk. Dr. Baillie met with an instance of chronic hydrocephalus in a man aged fifty-six, and whose ventricles contained six ounces of serous fluid, and his chief symptoms were pain in the head, and a loss of memory so great that he could recollect only five words, which he continually reiterated to express all his wants. Cardinal, whose case has been mentioned, had more memory, and he prided himself, says Dr. Elliotson, in being able to say "The Belief," but he usually stumbled when he got to Pontius Pilate. This man was epileptic, of very feeble intellect, and so irascible as to be always quarrelling with the patients, and would have been extremely difficult to manage except for his muscular debility. Heberden, however, mentions a case in which eight ounces of water were found in the ventricles, and yet no symptoms of hydrocephalus existed during life.

Diagnosis.—The external characters of chronic hydrocephalus are so extremely marked that it is hardly possible to mistake them.

Prognosis.—The immediate danger in these cases is not great, but few patients survive the age of puberty; Cardinal, however, lived to the age of thirty-two. Arrival speaks of another instance which reached forty-five; and Gall of a third who survived till fifty-four.

Treatment.—In congenital hydrocephalus the unassisted efforts of nature seem incapable of effecting a cure; and it is extremely problematical if medicine has been of any use. When, however, the case is pronounced hopeless, the propriety of evacuating the water by means of an operation may be entertained. Golis has given the names of twenty-seven writers who have expressed themselves in favour of it, especially if the fluid be slowly evacuated, and at several repetitions of the operation; yet he himself, along with seven or eight others, including Boerhaave, proscribe it altogether as cruel and useless; however, it has been successful.

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* *Med. Chir. Trans.*, vol. viii.

When the operation is performed, it seems an axiom that the fluid should be allowed to escape gradually, for otherwise extreme faintness and collapse may be expected. In such case small doses of ammonia, or a few tea-spoonfuls of brandy and water shortly revive the little patient. Should, however, at a subsequent period, re-action take place, a few leeches and a cold lotion ought to be applied to the head.

It seems also determined, that the younger the child the more chances of success; for if it lives a few years, the sutures of the cranium, though open at the top, are united by bone towards the base of the skull, and thus present a mechanical obstacle to the closing of the sutures, and consequently the operation must fail.

If this disease should occur in after-life, blisters and mercury to salivation are the remedies most relied on.

Hydrorachis, spina bifida, or dropsy of the Spine, is an excess of serous fluid in the cavity of the Spine. This is, for the most part, a congenital disease, and, in its rarest forms, the fœtus is born without a spinal cord, the membranes forming a sac filled with fluid. In other cases the axis of the spinal cord is open, as in fœtal life, and filled with fluid; while in others the spinal cord is perfectly formed, only compressed by the quantity of water by which it is surrounded. In the more usual form of the disease there is found one, more rarely two, external swellings, containing fluid. The form of these watery tumors is flat, semilunar, or pyramidal. They are formed by the expanded membranes of the cord, covered with the common integuments. The cleft by which they communicate with the spinal cavity varies greatly, and usually results from one or more vertebræ being defective; in rarer cases, by a round aperture in one of the vertebræ, and still less frequently by a similar aperture between an intervertebral space. The symptoms of hydrorachis are debility, emaciation, and very generally palsy, as well as anæsthesia of the lower extremities, resolution of the sphincters, inability to take the breast, and convulsions. The life of the child usually terminates at birth, or shortly after; but in some few instances the party attains a greater age. Paletta met with one patient seventeen years old; Henderson saw another at eighteen; Warner, one at twenty; Camper, one at twenty-eight; and Cowper, one that survived till thirty. Dr. Copland, in 1822, saw a young woman aged seventeen, who, in addition to the singularity of hydrorachis, menstruated regularly from two ulcers in the thighs. The tumor in this case measured thirty inches in circumference, and she passed her fæces involuntarily. She was in good health at this period, but died a few months afterwards. No efficient treatment, perhaps, exists for this disease.

DROPSY OF THE ORGANS OF RESPIRATION.

Angina Œdematosa—Œdema of the Glottis—Hydro-glottis—is an effusion of serous fluid around and into the lips of the glottis.

Remote Cause.—This disease is occasionally idiopathic; often preceded by other forms of dropsy; and it is also in some instances the result of inflammation. When this form of angina is idiopathic, it probably most often results from cold or wet; when it is preceded by other forms of dropsy, those dropsies are usually caused by the poison of scarlet fever, or of the paludal fever.

Predisposing Causes.—When œdema of the glottis is idiopathic, it has occurred most frequently in the adult between fifty and sixty. When preceded by other dropsies, it is most common in early adult age; and when it results from inflammation, most usual in children.

Pathology.—In these cases the loose sub-mucous cellular tissue of these parts is seen distended with a colourless serous fluid, sometimes merely closing the lips of the glottis, but at other times swelling out as big as an egg. If the disease be idiopathic, or the termination of dropsy, no redness is present. If, however, it is the result of inflammation, the quantity of fluid effused is less, but the tissues are red, injected, thickened, and easily torn.

Symptoms.—This disease, if idiopathic, or caused by dropsy, is usually sudden in its attack, the patient being seized most unexpectedly with a difficulty of breathing and a sense of suffocation, which shortly arises to orthopnœa. The head is now thrown backwards, the countenance becomes purple, the hand of death is on the patient, and for the most part he dies in a few minutes suffocated.

Diagnosis.—Œdema of the glottis is distinguished from œdema of the lung by the chest being perfectly sonorous.

Prognosis.—The prognosis is, in every case, most unfavourable.

Treatment.—The treatment of this disease is necessarily energetic, and the two following cases will exemplify this axiom. Two patients, both of them females, about forty, were brought on the same day to St. Thomas's Hospital, and as nearly as possible in the same state of idiopathic œdema of the glottis. They had been ill a very few days, and they now suffered from loud croupy breathing, orthopnœa, purple lips, and the other symptoms which have been described, but otherwise they had not suffered greatly in health. One was bled and blistered; the other was bled, blistered, and took mercury so as to affect the mouth. The latter recovered, while the former died. On examination, the cartilages of the larynx were ossified, but the cause of death was simple œdema of the glottis. In extreme cases it is, perhaps, right to perform tracheotomy.

Œdema of the Lungs—Hydro-pulmonalis—is an effusion of water or serum into the cellular tissue of the lungs. Laënnec says this disease, though common at the time he wrote, was nevertheless very little known. He thinks Albertini and Barrère, of the military hospital at Perpignan, first described it in 1753, but failed in attracting the attention of the profession to it.

Œdema of the lung is, in a very few instances, a primary disease. More commonly it occurs at the close of other dropsies, and in some few instances results from inflammation: its remote and predisposing causes are little known.

Pathology.—On opening the body in these cases the lung not only does not collapse, but bears the impress of the rib; and if the finger be forcibly placed on it, the impression remains. If the lung be now cut into, a colourless transparent serum flows from it; but its structure is healthy, although often of a pale yellow or greenish colour, being stained by the effused fluid. The accidental conditions are bronchitis and pneumonia, in the first or second degree, and diseased states of the heart.

Symptoms.—The symptoms which denote this affection are a sudden and great difficulty of breathing, incapability of lying down, cough, with a more than usual fluid expectoration. The face also is livid, and the pulse rapid.

If the effusion be considerable, the respiration is loud and tracheal, while a dull sound is returned all over the chest. If of less amount, the *râle* is subcrepitant, while sufficient air penetrates the lung for the chest to return a natural sound.

Diagnosis.—This disease is to be distinguished from hydrothorax, and the diagnosis is difficult; but the change of position does not so distressingly and immediately affect the patient's breathing in this disease, the water more slowly gravitating towards the root of the lung. The phenomena of ægophony are also wanting in this affection.

The *Prognosis* is always most unfavourable, and the patient seldom survives more than a few hours.

Treatment.—If this disease is ever idiopathic, it probably must destroy the patient even before our most active remedies can act upon the system; but the only chance for the patient must be energetically to use perhaps mercury and the bitartrate of potash.

Hydrothorax is the effusion of water into the cavity of the chest, and was a disease known to Hippocrates, who proposes the singular practice of shaking the patient, in order to determine the existence of the disease. 2149 cases are said to have died of this disease in England and Wales in 1839.

Remote Cause.—Hydrothorax is occasionally a primary idiopathic disease, and is the result of all the usual causes of dropsy, as cold, wet, or intemperance. In other cases it results from disease of the heart, liver, or other causes obstructing the circulation. Inflammation of the pleura is also a cause; and often results from the action of a morbid poison, as the paludal poison, or that of scarlet fever.

Predisposing Cause.—Hydrothorax is infrequent in children, and not common till after the age of forty, when the viscera become disorganized, and low inflammations are readily set up. It occurs in both sexes in the ratio of 1199 males to 950 females, or as ten to twelve nearly.

Pathology.—In idiopathic hydrothorax, the chest, on being opened, is found more or less full of water, which being removed, the pleura is seen sometimes healthy, but more generally of a dark colour, a quantity of venous blood being congested in the vessels from deficient oxygenation. The fluid may be effused into one or into both cavities of the chest. It may also be limpid and colourless, like water; but more commonly, perhaps, it is citron-coloured, and contains much albumen. The quantity effused varies from a few ounces to many pints: eight and nine pints are not unusual; and Laënnec states that he once removed twelve pints from the right side of the pleural cavity. When the quantity of fluid is large, the lung is thrust up under the sternum, and so compressed as to be sometimes no bigger than the fist.

When hydrothorax is secondary, almost every chronic affection, either of the liver, kidney, or heart, may be found co-existing at the same time. Occasionally it is the result of pleuritis, and in these cases the serum is more flocculent, contains more albumen, and portions of lymph are often also seen adherent to the pleura pulmonalis, or pleura costalis: the two pleuræ are also often more or less united.

Symptoms.—The effusion may take place either gradually or suddenly. In the former case it may be so slow that the lung is able to adapt itself to the presence of the accumulating fluid, and the symptoms will consequently be much less marked, although the effusion be large. In the latter case the functions of the lung are almost at once suspended, the countenance livid, the breathing greatly disturbed, and the patient perhaps has hardly time to rush from his bed before he expires in the paroxysm.

When the effusion is slow, the symptoms are difficulty of respiration, which is carried on rather by the shoulders and diaphragm than by the intercostal muscles, some expectoration, lividity of the face or lip, œdema of the legs, and either a very full labouring pulse, or else one that is small, frequent, and intermitting: the urine also is extremely scanty. As long as the effusion is moderate, the patient is unable to lie down, from the sense of suffocation produced by the fluid gravitating towards the root of the lung, and compressing the larger bronchi, and he therefore sits propped up by pillows, with his head bowed forwards. In the event, however, of the effusion being so considerable that the function of the lung is entirely suspended, the patient can lie flat in his bed without experiencing any inconvenience.

When the effusion is sudden and of some amount, and the patient survives the first attack, the dyspnœa is liable to severe exacerbations, and is well represented by Dr. Darwell (*Encyclopædia of Medicine*):—"in a tray-painter these paroxysms came on every morning between two and three o'clock, and lasted for an hour or more. This man was compelled, by a sense of suffocation, to start out of bed, and while the attack lasted he placed himself against an open window, gasping in the most terrific manner for air. His death took place suddenly, and on examination the lungs were found to be œdematous. Upwards of two quarts of serum were contained in the cavities of the pleuræ, and a few ounces of coffee-coloured fluid in the pericardium. The only other morbid appearance in the whole body was hypertrophy of the left ventricle.

When hydrothorax is symptomatic, or consecutive of affection of the heart or of other disease, it is generally preceded by swelling of the legs or eye-lids,—by the urine being plentiful and albuminous, or else scanty, high coloured, and loaded with the usual salts,—and indeed by most of the symptoms of dropsy generally. In these cases the effusion seldom takes place into the chest till a few days before death, rendering the agony doubly painful and suffocating.

When the effusion is moderate, auscultation gives bronchial respiration, some mucous rhoncus, and also bronchophony, and occasionally that undetermined condition called ægophony, which is a broken sound like the bleating of a goat, or the amusing notes used in the exhibition of Punch, and which is heard as though the patient was speaking at the end of the stethescope, but not through it. This singular phenomenon is heard only in the back, and when the instrument is placed, as is supposed, about the level of the effused fluid. When the effusion is more considerable, the respiration is almost tracheal,—there is neither bronchophony nor ægophony, and a dull sound is returned over a greater part of the chest. Again, if the patient's chest be bared, there is no expansion on the side of the seat of the effusion, the respiration of that part being carried on altogether by the shoulders and diaphragm; and should the effusion be excessive, the affected side bulges out, as in empyema, and its intercostal spaces are enlarged and prominent.

Diagnosis.—The absence of pain, and of the other symptoms of inflammation, distinguish this disease from acute pleurisy. Should, however, the pleurisy be chronic it is impossible to distinguish the two diseases, except by the previous history. The diagnosis also between hydrothorax and œdema of the lung is, as has been stated, most difficult.

Prognosis.—Some cases recover from hydrothorax, but they are few, so that the prognosis is in all cases extremely grave and unfavourable.

Treatment.—The treatment of hydrothorax is of great difficulty, from the many causes on which it may depend, and also from the almost uniformly intractable nature of the disease. As a general principle, mercury combined with squills, digitalis, or the bitartrate of potash, and pushed so as to affect the mouth, is among the most valuable of our remedies. It is much more efficacious in this form of dropsy than in ascites, and it is remarkable in many cases to observe how immediately the symptoms are arrested as soon as the gums are touched. Should this treatment fail, we must have recourse to gamboge or to other purgatives or diuretics, and of these some one perhaps may be found to succeed, yet much more commonly they all fail. With respect to bleeding, it seems only admissible in two cases, and then only to a moderate amount, as when hydrothorax supervenes on pleurisy or on disease of the heart with expectoration of blood. The general want of success attending the treatment of hydrothorax has induced some practitioners to propose the operation of paracentesis of the chest. It is questionable whether any case is on record of a successful result of paracentesis in cases of idiopathic hydrothorax; but there seems no reasonable objection to the operation when all other methods are hopeless. It should be borne in mind, however, that both sides in all probability must be tapped,—that the operation is not without danger, both from the wound and from the admission of air into the cavity of the pleura; also, that it has no power to remove the hydropic diathesis; and, lastly, that it is extremely likely the disease may co-exist with œdema of the substance of the lung.

Hydrops Pericardii.

Hydrops pericardii is a collection of water in the pericardium.

Remote Cause.—Hydrops pericardii occurs in a few instances as an idiopathic disease, and probably results from the causes of dropsy in general; more commonly it results from inflammation, and that inflammation may be caused by rheumatism, by the paludal poison, or by the poison of scarlatina. In other cases it is only the last stage of some other form of dropsy.

Predisposing Causes.—When hydrops pericardii is idiopathic, it usually occurs before the age of puberty; when caused by a morbid poison, it is more common in adult age; and when from previously existing disease, it occurs chiefly between 40 and 60. Both sexes are liable to this disease, and perhaps in nearly equal proportions.

Pathology.—In hydrops pericardii there is no alteration of structure, says Laënnec, of the heart or of its membranes. Some authors have stated that the heart is macerated in these cases; but such writers, he adds, must have badly observed, and still worse expressed, what they have seen. When it is the result of inflammation, the usual appearances of pericarditis are found. The fluid contained in the pericardium is usually limpid, without any flakes of albumen. Most commonly it is colourless, but occasionally it is of a citron or red hue, from containing a small portion of the red particles of the blood. Its quantity is very various; sometimes a few ounces, sometimes two or three pints; while Corvisart states that he met with one case in which it amounted to eight pints. The smallest of these quantities is in great excess, for Dr. Darwell has given the results of the examination of 150 bodies, dead of all diseases, and he found that in 30 only out of that large number was there any appreciable quantity of fluid found in that cavity. It seems probable, therefore, that during life the secretions of the pericardium exist only in a state of vapour.

Symptoms.—If we consult those authors who have treated on dropsy of the pericardium, we find little agreement among them of the pathognomic signs of this disorder. Lancisi considers the leading symptom to be the sensation of an enormous weight in the præcordial region. Reimann and Saxonia assure us that the patient feels his heart swimming in a great quantity of fluid. Senac has seen, in the third, fourth, and fifth intercostal spaces, the waves of the effused fluid; and Corvisart says he has felt them. The latter physician adds to this symptom a sense of weight at the heart—a greater dulness on percussion; a pulse small, irregular, and frequent; together with a tumultuous but obscure action of the heart, as if it moved in a larger circle. He speaks also of frequent syncope,—of general œdema,—and of the patient being unable to lie down in bed. Rostan is so dissatisfied with all that has hitherto been observed respecting the diagnostic symptoms in this disease, that he affirms it can only be determined by a process of negation, or, that when we are unable to refer the existing symptoms to any other assignable cause, we may infer that they can be owing to no other circumstance than water in the pericardium. A youth, about 15, was admitted some years ago into St. Thomas's Hospital labouring, as was supposed, under a slow fever. The fever subsided, when he suffered much from cough and affection of the chest. It was not phthisis, for he did not expectorate; it was not hydrothorax, for he could lie down; and it was not pneumonia or pleurisy, for there was no pain or other symptom of these disorders. It was therefore inferred it was water in the pericardium; and, on laying the hand on the cardiac region, the heart was found to be beating feebly but rapidly, and on spanning the limits of its apparent action, it was found moving in a space of several inches. The diagnosis was consequently water in the pericardium; and on examining the poor lad, who died some weeks after, three to four pints of fluid were found in the pericardium, without any other existing disease.

Laënnec says he has had but few opportunities of observing dropsy of the pericardium, and is doubtful if the stethescope would be useful in determining the disease. He thinks percussion and inspection would not detect less than a pint; but should the water exceed two pints, he thinks these means would determine it.

Diagnosis.—The difficulties attending this question have been already stated; and these difficulties are increased by the fact, that effusion into the pericardium was found by Chossat in all the animals killed by him in his experiments on inanition. Consequently a similar effusion in all probability takes place in many chronic diseases when the agony has been long, and is one of the last phenomena of waning life.

Prognosis.—Always most unfavourable.

Treatment.—Laënnec thinks we may cease to regret our imperfect knowledge of the symptoms of hydrops pericardii on account of the few resources we possess for the cure of this malady; for mercury, digitalis, the bitartrate of potash, as well as every other class of medicinės, have been found powerless against it. Under these circumstances paracentesis has been recommended; and if performed, Laënnec advises trephining the sternum above the ensiform cartilage, which would enable us to see and touch the pericardium, and even to inject a fluid, if thought advisable.

ASCITES—(ασκος, a bladder)—

Is a collection of serous fluid in the cavity of the abdomen. Only 120 deaths are recorded to have died of this disease in England and Wales in 1839; but 12,251 are stated to have died of dropsy of uncertain seat, and a large proportion of these must have contained water in the abdomen.

Remote Cause.—The remote causes of this form of dropsy are the same as those of dropsy of the chest; but those causes act more energetically on the peritoneum than on the pleura. Ascites, for example, is more frequently produced by large bleedings, by phthisis, and by disease of the heart or kidney, than hydrothorax. Tumors, also, obstructing the circulation, are more frequent in the cavity of the abdomen than of the chest. Changes of temperature, morbid poisons, a diseased state of the intestines, or of the liver, or of the spleen, are also causes which act more frequently in the production of ascites than of hydrothorax. In the female, also, many peculiar causes are in action to produce ascites: thus ascites sometimes follows parturition. Two cases of ascites were lately in St. Thomas's Hospital from the parties wearing large pessaries. Ovarian dropsy also frequently terminates in ascites.

Predisposing Causes.—Every age is liable to ascites, from the infant at the breast to the extremest period of decrepitude; in general, however, ascites is rare before puberty. The largest class of ascites, or that arising from disease of the kidney, takes place between 20 and 45; the next largest class, or that from disease of the liver or the heart, occurs most frequently from 40 to 60. Both sexes are liable to ascites, and apparently in nearly equal proportions.

Pathology.—Cases of ascites are often examined in which no affection of the peritoneum or of any organ or tissue can be discovered, and consequently it is essentially only a disease of function. More commonly, however, the peritoneum is either chronically or acutely affected, or some viscus is diseased, or some tumor presses on the large vessels, and causes the effusion which constitutes the ascites.

When the peritoneum is chronically affected, it becomes thickened, opaque, and, in some cases, of an aponeurotic whiteness. In general the portions covering the liver or the spleen are much the most thickened and diseased, owing probably to primary disease of those organs having extended to their peritoneal covering; on the contrary, if the peritoneum be acutely inflamed, it is red and injected, and more readily detached from the walls of the abdomen than in health: it may also be tuberculated, or the seat of other disease.

The kidney is the organ most frequently affected when the ascites is secondary: indeed the number of cases of this form of dropsy amount, according to Dr. Wells, to 55 per cent. of the whole number treated, and according to Dr. Christison, to 75 per cent. The kidney is found in this affection in every possible state of disease,—that is, it may be atrophied, hypertrophied, encysted, tuberculated, or cancerous; but in the vast majority of cases it is found in that peculiar state of degeneresсence usually termed Bright's kidney, and in every stage incident to that disorder.

The next most frequent concomitant affection is disease of the heart and large blood-vessels, to which it is supposed that at least one-fourth of all the cases of ascites is owing. In these cases the cavities of the heart are often enlarged, and their walls either hypertrophied or atrophied, or else the valves are ossified, or their action otherwise impeded. The aorta also is often pouchy, and its elasticity destroyed by ossific deposit or other affection.

The liver and spleen are the organs next most frequently affected; and they may be found in every possible state and stage of disease. In the former of these instances it is generally supposed that the dropsy is owing to the obliteration of the capillary vessels; looking, however, to the thickened state of the peritoneum covering the liver, it seems that sympathetic irritation of that membrane must at least often contribute to the production of ascites. No satisfactory theory has yet been proposed for ascites resulting from diseased spleen; but looking to the excessive hæmorrhage, which often terminates the life of the patient in these cases, it seems probable that it must in some measure depend on an altered state of the blood.

In general anasarca accompanies ascites, and is an abnormal collection of serum in the cellular tissue of the lower extremities or other part of the body. In these cases the cellular tissue is found in very varied states: in some cases the cells are greatly enlarged, in others obliterated; while the tissue itself, generally thickened, tears most readily in some cases, while in others it is not only greatly thickened, but also greatly indurated. The fluid also which it contains is generally limpid and watery, holding in solution a large portion of albumen, and probably of urea, while in other instances the fluid is viscid and contains lymph.

The quantity of fluid contained in the abdomen varies from a few ounces to many gallons; three to four gallons are by no means unusual, and as much as eighteen gallons are said to have been drawn off at one time by the operation of paracentesis. The quality of this fluid is very various. In colour it is generally green or yellow, in consistency viscid, often containing so much free albumen as to be incapable of flowing through the canula. When treated with nitric acid that substance is thrown down so abundantly as to form a jelly, or a still more solid mass. In other cases it is mixed with lymph; and, in a few instances, contains a large number of hydatids. When the urine is scanty the effused fluid contains urea, and also the usual salts of the blood.

Symptoms—The symptoms of ascites are extremely well marked, but vary in some degree according to the cause, so that it will be better to give first a general outline of its more prominent features, and afterwards to point out those particular symptoms which denote the cause from which it springs.

In ascites, if the quantity of fluid effused be considerable, the abdomen is distended and shining, with a number of large superficial veins creeping over its surface. From the weight of the abdomen the gait of the patient is upright like a pregnant woman, and he walks wide between the legs from anasarca. In bed he is unable to lie down on account of the fluid in the abdomen gravitating towards the chest and compressing the lungs, so that he is obliged to be assisted by the dropsy-bed. If the anasarca be limited to the lower extremities the upper portion of his person is in general greatly emaciated, and his sharp and pinched features and his withered arms form a striking contrast to his protuberant abdomen and swollen legs. On the contrary, if the anasarca be general, the trunk, the arms, the hands, the eye-lids, and face generally are tumid and swollen to a most unsightly degree. In one case now in St. Thomas's, the features of the patient are lost in the general œdema, while from the pressure of some enlarged glands of the neck those parts of the cheek which are usually red are purple, and the tip of the nose, instead of being white, is one patch of ecchymosed venous blood. The urine is often defective in quantity, but is sometimes natural and sometimes in excess. The skin is dry and the patient thirsty; his appetite greatly impaired, and his spirits greatly depressed.

The progress of the disease is seldom accompanied by any severe constitutional symptoms; but at length the legs and scrotum become greatly distended, and often inflame, so that the patient sometimes ultimately falls from gangrene of these parts. Again, bronchitis may take place; or, the urine becoming nearly suppressed, effusion may occur in the chest, or in the head, and the patient die comatose, or of hydrothorax.

The favourable circumstances are, the secretion of urine being re-established and becoming natural, the subsidence of the anasarca and of the ascites, and then a gradual return to health.

The presence of water in the abdomen is determined by percussion of that cavity; and the best mode is to place one hand on the abdomen, and to give a sharp but gentle tap on the opposite side with the fingers of the other, when, if water be present, a fluctuation will be felt; when, however, the quantity of fluid is small the fluctuation is best felt by percussing the side of the abdomen, or from before backwards. The existence of fluid in the cellular tissue of the trunk or extremities is determined by the finger leaving a mark or "pit;" the water, being inelastic, is displaced, and thereby graviting back the part does not recover its original form and fulness for some seconds.

The ascites may form suddenly and the patient be distended in a few hours, or it may take weeks or months for the fluid to accumulate. The duration of the disease is very various. If the effusion be general, the patient's life may terminate in a few days; but more commonly the affection is chronic, and the patient survives many weeks or months. Such are the more general laws of ascites; but it is now necessary to pass to those particular forms which constitute its varieties.

Ascites sometimes results from the large effusion of serum which is poured out occasionally in acute forms of *Peritonitis.* In this case the abdomen is extremely painful, the pain much increased on pressure, and the pulse quick. The patient very generally recovers from this affection; but if he falls death usually occurs within a very few weeks from the first attack. Ascites sometimes results from chronic peritonitis; and now, although the patient sometimes suffers much pain, more commonly this symptom is wanting, or only occurs in occasional paroxysms; so that he appears ultimately to fall from the conjoint effects of the anasarca and of the ascites. The urine is scanty, but for the most part free from albumen in both these forms of disease.

A *diseased heart*, or diseased state of the aorta, is often the primary cause of ascites, and in this case also the urine seldom contains any albumen. The heart's *bruit*, its impulsion, together with the character of the pulse, will in general give the particular lesion under which the party labours. This dropsy may first show itself either by effusion into the abdomen, or else into the cellular tissue of the lower extremities, causing anasarca. When effusion has taken place, it is remarkable that the action of the heart becomes more regular, its impulse more natural, the pulse slower and steadier, while perhaps the *bruit* disappears altogether. This apparent amendment, however, is fallacious, for the dropsical symptoms increase, effusion takes place first into one cavity and then into another, so that the patient seldom long survives this fatal symptom. The urine in this form of dropsy is generally deep in colour, small in quantity, and of a healthy density.

When ascites arises from a *diseased liver*, that viscus is generally enlarged, especially the left lobe; but it is, in some instances, smaller than usual. The ascites in this case has no new feature, except that the patient may or may not be jaundiced. In the former case all the fluids effused are of a yellowish or greenish yellow colour. The urine also is loaded with bile, which is generally turned green by the addition of nitric acid; while in a smaller number of cases the bile appears to be in a peculiar state of combination with the urine, so that the acid has now no effect on it; the urine likewise is always small in quantity, much loaded with the usual salts, and of a high density. The bowels are difficult to act upon, and the patient is liable to severe abdominal pains similating chronic peritonitis. The pulse continues throughout the disease for the most part natural, and the patient usually falls into a more or less typhoid state, from which there is no recovery.

In ascites from disease of the *spleen* the urine is also in general healthy, though scanty in quantity. This viscus is uniformly enlarged, and can readily be felt occupying the left hypochondriac region, and thus the cause, though not its exact nature, can be determined; for we have no diagnostic symptoms denoting whether the spleen be simply hypertrophied or in a cancerous or tuberculated state. The early symptoms are similar to what occur in dropsy of the liver; but the termination of the disease, if the patient falls, is singular, or by hæmorrhage from the stomach and bowels, often so profuse as to amount to many pints in a few hours, greatly exhausting the patient, and hastening the fatal catastrophe.

In dropsy from disease of the *kidney* the urine may or may not contain *albumen;* but in the great majority of cases it does so. When albumen is absent, as the chronic forms of diseased kidney are all devoid of pain, we are unable to determine either the seat or the nature of the disease with which it is affected, and the ascites is consequently in general attributed to an affection of the peritoneum, of the liver, or other viscus. When, however, albumen is present, it may arise from mere functional disease of the kidney; from its being beset with hydatid cysts; or from its being indurated, or the seat of other structural disease; but by far the most common cause, however, of albuminous urine is that peculiar degenerescence called Bright's or the granular kidney. This term embraces many different stages or chronic forms of disease; but as these are all devoid of pain or other local symptoms, the particular form of disease is a mere matter of calculation deduced from pathological investigations. The dropsies which follow this latter morbid state of the kidney are frequent, are accompanied by albuminous urine, and follow many singular laws.

In dropsy arising from granular kidney, the lower extremities generally first become anasarcous; and this is so constantly the case that the disease is usually termed the "leg dropsy;" and, after this, effusion usually takes place into the cavity of the abdomen, and subsequently perhaps into that of the chest and head. The anasarca, however, is not confined to the lower extremities, but the whole cellular tissue of the body is often infiltrated with serous effusion. Thus, the trunk, the chest, the arms and hands, as also the face and neck, are often wonderfully swollen and distended in this extraordinary and fatal disease. The effusion having taken place, Dr. Christison divides the disease into three stages, principally deduced from the state of the urine. It must be admitted, however, that these stages are not always well marked, and that much difference of opinion exists as to the phenomena of the latter stage.

In the first stage, the quantity of urine passed is sometimes natural; in a few instances it is increased; but far more generally it is diminished. Most usually in colour it differs little from that of health; but it is turbid from being mixed perhaps with a small quantity of mucus. A sediment, too, sometimes forms in this stage, which is either lithic acid, or the lithate of ammonia, or bubbles form as with soap and water. In a smaller number of cases the urine is of a bloodred tint, occasionally mingled with clots, and sometimes with pure blood, which afterwards coagulates.

By far the most remarkable property of the urine, however, in this as in every other stage, is its coagulability under the action of heat or acids, showing the presence of albumen. The quantity of albumen varies greatly, sometimes the addition of the acid merely rendering the urine opaline, while at other times the albumen is precipitated in heavy white flakes, which occupy from one-third to three-fourths of the whole space of the urine tested. Still, though the apparent volume of the albumen is great, yet its weight is trifling, for 10 parts by weight in 1000 parts of urine will render it almost a thin uniform pulp when heated. The greatest quantity Dr. Christison has met with is 27 parts in 1000; and in this case the urine was converted into a solid gelatinous mass, from which no fluid issued when the tube was turned upside down.

Besides containing albumen, the urine also deviates from the healthy standard in containing a less quantity of its usual solid ingredients; the daily discharge of solid matter being from one-sixth to one-fourth less than the healthy average. The loss of weight is chiefly in the urea, but the salts are likewise diminished. The urea is not only deficient in quantity, but is supposed to be imperfectly formed, the urine having a great tendency to undergo decomposition. Another remarkable property of this urine is, that although loaded with albumen, its specific gravity is reduced; or supposing the healthy average to vary from 1020 to 1030, it now varies from 1016 to 1025. The pathognomic characters of the urine in the incipient stage of granular disorganization of the kidney are, then, a moderate reduction of density, an albuminous impregnation, and a material diminution of the solid ingredients.

As the disease advances, the second stage forms, and the quantity of urine is now often little below the standard of health, and in most instances even much exceeds it, the patient passing sometimes from 100 to 130 ounces daily. Its colour is generally pale, and its specific gravity much reduced, sinking to 1016, 1012, 1008, and even as low as 1004. Albumen is still thrown down by the usual tests, and if the quantity of urine is small, that substance is greatly abundant and flaky; when, however, the quantity is increased, the proportion of albumen seems diminished, either the now greatly impoverished state of the blood affording a less amount of it, or else that it is diluted by the greater amount of watery urine. The other solid contents are also reduced, or from 67·7 parts in 1000 to about 24 parts in 1000.

In the third stage, according to the observation of most writers, the quantity of urine decreases, and the proportionate quantity of albumen is increased till at last the urine is in some cases almost altogether suppressed, or else nearly pure blood is passed; and there are even cases in which the urine contained in the bladder has been found coagulated after death. Dr. Christison, however, states as the result of his practice, that the albumen diminishes in this stage.

Besides the alterations in the urine, changes not less remarkable take place in the condition of the blood. The density of this fluid in health is between 1029 and 1031; but in granular degenerescence of the kidney it is often as low as 1020, while the solid contents are reduced from 100 or 102 in 1000 to 68, 64, and even to 61 parts in 1000. This reduction equally extends to the albumen as well as to the saline ingredients, so that the serum is often greatly deficient in that substance, and coagulates but loosely when heated.

Another not less remarkable departure from the healthy constitution of the blood is the presence of a large quantity of urea in the circulating fluid. This fact was first hinted at by Dr. Bostock, and has been subsequently established by Dr. Christison, who affirms that when the urea is reduced by disease to one-third its natural amount in the urine, it is always to be detected in the blood. Again, while the other constituents of the blood are diminished, the fibrine is usually increased in this remarkable disease, or instead of 25 to 52 parts in 10,000, the proportion in health, it now varies from 32 to 80 parts in 10,000. This augmentation is supposed to depend on the degree of constitutional re-action caused by the local inflammation under which the patient so often labours. Dr. Christison, from whom these details are borrowed, states that the hæmatosine or colouring matter of the blood is little affected, and also that in advanced stages of the disease the density and solid contents of the serum, which have been shown to be invariably reduced at the beginning of this affection, gradually return to the healthy standard, and even exceed it. This, however, can be by no means constantly the case.

The extraordinary manner in which the blood becomes impoverished and robbed each successive day of a portion of its most nutritive ingredients, must prepare us to expect many diseases both of function and of structure in the course of this affection, and there are few organs or tissues that do not suffer. The most frequent lesions are perhaps those of the alimentary canal. Impaired function of the stomach is frequent in every disease of the kidneys; but in this affection it is often so excessive as to constitute a disease more distressing even than the original complaint. In some cases the stomach suffers from simple dyspepsia, in others from sickness with occasional vomiting, while in others everything is returned. This chronic vomiting is most frequent in the second stage of the disease.

Another very common symptom in albuminous urine dropsy is diarrhœa. This affection generally arises from irritability of the coats of the intestines, but it occasionally terminates in ulceration of the bowels. It is frequently but not always attended with pain. The evacuations are loose, but present nothing remarkable, except being occasionally intermixed with portions of shred-like matters. This diarrhœa is sometimes mild, but more often severe, and greatly exhausts the patient without reducing the dropsy. This affection is common in every stage of the disease.

Besides functional or structural disease of the mucous membrane of the alimentary canal, the peritoneum is liable to be inflamed, and the patient to be thus prematurely cut off. Dr. Bright found traces of inflammation of this membrane in 45 cases in 100, and in 12 or 13 it was extremely well marked. The symptoms in this case are of course great pain of the abdomen, with a rapid and small pulse.

The lesions of the organs contained in the chest are as frequent as those of the abdomen. Bronchitis with purulent secretion is extremely frequent, and is always a complication indicating much danger. In some instances it is associated with emphysema of the lung, producing urgent dyspnœa. The substance of the lung, however, is seldom inflamed, Dr. Bright having found only 5 cases in 100 in which there were any traces of recent or of old pneumonia; but œdema of the lung is frequent, it having occurred 31 times out of the 100 cases. Apoplexy of the lung has also been met with.

The pleura is, however, of all the tissues of the respiratory organs, that which is the most commonly affected, it being found more or less diseased in 3 cases out of 4; or in 40 cases there were old adhesions, in 16 cases evident signs of recent inflamation, while in 41 cases there was water effused into the chest.

The heart has been found diseased in 69 cases out of 100, and the lesions have consisted chiefly of hypertrophy, with or without valvular disease. In 52 cases of hypertrophy, chiefly of the left ventricle, no valvular disease could be detected, but in 34 of these the aorta was more or less diseased. When the valves have been found diseased, they have been for the most part those of the left side of the heart, or the aortic and mitral valves. When disease of the heart is conjoined with granular kidney, the patient often suffers from severe and fatal hæmorrhage from the bowels.

Solon says, of all the influences which granular kidney exercises over the œconomy, the gravest is that which it exerts over the brain. The first symptom of the affection of this organ is long-continued and severe headache, then obstinate somnolescence, and lastly coma; and 8 cases out of 10 are supposed to terminate fatally, either by convulsions, coma, or by serous apoplexy. But although these symptoms are formidable, the lesions are limited to the membranes, and these are sometimes absent, for in 48 cases only out of 100 Dr. Bright found the arachnoid diseased; or in 13 cases it was opaque, in 29 serum was effused into its cavity, and in 6 there was water in the ventricles. The substance of the brain has been for the most part found healthy.

It is singular that the liver, spleen, and pancreas have a great immunity from disease in this form of dropsy, a fact the more remarkable as the patients are often habitually intemperate. The instances of confirmed disease of structure of these parts were so few, that they did not amount to more than 18 in 100 cases, while in 32 the deviation from the natural structure was exceedingly slight, little more than a mottled state caused by an irregular distribution of blood throughout the texture, a condition frequently observed when the circulation through the chest is obstructed. Such are the peculiar symptoms which the different genera of ascites present.

Diagnosis.—Ascites is readily distinguished in the male from every other intumescence of the abdomen by the fluctuation on percussion. In the female it can only be confounded with ovarian dropsy.

Prognosis.—The prognosis in anasarca in young persons not labouring under any organic disease is always favourable. If, however, it be consecutive to organic disease, a fatal termination is ultimately to be feared.

Ascites arising from indeterminate causes is often recovered from, but no case is free from danger, the peritoneum often taking on the character of a cyst, and resisting the action of all medicines.

Ascites depending on moderate inflammation of the peritoneum is often recovered from, and especially if the inflammation depends on the action of the paludal poison.

Ascites with albuminous urine, arising from mere functional disorder of the kidney, is generally recovered from; but if the structure of the kidney be impaired, the disease is always grave and generally fatal. In a few cases, however, the disease subsides, and the patient continues well for two, three, or four years, when he generally relapses and dies.

Ascites from disordered function of the heart is often recovered from; but if it depends on diseased structure either of the heart or large vessels, some temporary amendment may take place, but the patient quickly relapses and finally sinks.

Ascites depending on diseased structure of the liver or of the spleen is rarely recovered from unless the primary disease be cured.

Treatment.—The ancients witnessed so few recoveries from dropsy, that they looked on the restoration of the patient as an accident, or as a special blessing from heaven, rather than the result of physical causes. The treatment of ascites in the present day, it must be admitted, is often unsuccessful; still it may be affirmed that one-half the patients are cured, which is abundantly sufficient to overthrow the opinions of the earlier schools. The treatment of any given case is often, however, of great difficulty; for the remedy which will cure one patient has frequently failed with another, and apparently under exactly the same circumstances. All that can be done, therefore, is to lay down some general rules, leaving their particular application to the discretion of the practitioner.

When ascites occurs without any obvious cause, and without albumen in the urine, the best medicine is unquestionably the bitartrate of potash, first introduced by Vicenti Maughini. This valuable remedy may be given either in divided doses, as ʒ j. three times a day, or every six hours, or else in one large dose, as half an ounce, strengthened, if the patient's bowels be confined, with ten to fifteen grains of jalap. When the smaller doses are used, it is often exceedingly useful to add ten grains of the citrate or tartrate of iron to each dose. If these remedies should fail, a grain of elaterium every night or every other night may be tried.

There is one form of ascites, without any obvious cause, in which the accompanying anasarca is caused by effusion of serum into the intermuscular tissue, and beneath the fascia of the legs, rendering them extremely hard and tense. Under these circumstances squills appear to be the best remedy, and by giving five to eight grains of the pulvis scillæ three times a day, the dropsy is always relieved and the patient sometimes recovered. If the stomach be irritable, half a grain of opium should be added to each dose, so that it may be retained.

Should the ascites arise from simple inflammation of the peritoneum, this form of dropsy in general yields to leeches and fomentations to the abdomen, together with the sulphate of magnesia ʒ j. c. tinct. hyoscyami, ♏ xv. every six hours. If, however, the case be severe, some mercury may be necessary, as the pil. hydrargyri, or moderate doses of the chloride of mercury.

When the inflammation depends on a morbid poison, the treatment varies according to the nature of that poison. Thus, if it be the result of the paludal poison, preparations of mercury are essential, and the ascites is cured as soon as the mouth is affected. On the contrary, should the ascites or anasarca arise from the poison of scarlet fever, it is in general necessary to bleed the patient. The quantity of blood taken should be proportioned to the age of the patient: a child of six years of age may lose from four to six ounces, an adult ten to sixteen ounces. After this, almost any active purgative will effect the cure,—as the bitartrate of potash, the sulphate of soda or magnesia, or repeated doses of rhubarb or jalap. In many cases, however, it is necessary to combine the purgative with some mild tonic, as the tartrate of iron, or with salicine.

When the ascites arises from disease of the heart, the kidney being sound, and the urine free from albumen, the treatment must have reference to the nature of that disease. If the valves of the heart are ossified or otherwise diseased, the patient, though he cannot recover, may be greatly relieved, and mist. camphor. ℥ iſs. c. sp. ætheris nitrici ʒ j. c. tinct. hyoscyami ♏ xv. c. tinct. digitalis, ♏ xv. c. magnesiæ sulphatis, ʒ j. ter die vel 6^{tis} horis, this mixture often greatly reducing the dropsy. When the stomach will bear it, the tinct. scillæ ♏ x. to ♏ xx. with a drachm of the acetate of potash, has occasionally succeeded. Small doses of elaterium, as $\frac{1}{8}$ to $\frac{1}{4}$ of a grain ter die, is a medicine that is also sometimes useful. Blisters to the cardiac region give relief; but it should be remembered that heart cases bear bleeding badly, and that operation should be avoided except in one case, or when blood is expectorated. If blood, however, appears in the sputa, ten to sixteen ounces may be taken not only without injury but with great benefit. In those cases in which the valves still continue healthy, but in which the heart is enlarged and hypertrophied, and has acquired a rolling irregular action, the dried seeds of iberis amara are the best remedy. The dose is from iij. to v. grains three times a day.

The ascites may be caused by disease of the liver; and should that organ be merely inflamed or hypertrophied, without other alterations of structure, the dropsy is often cured. The treatment is by bleeding, and the neutral salts, as the sulphates of magnesia or of soda, or, should they fail, by moderate doses of calomel. When, however, its structure is otherwise altered, the patient is seldom cured; but the disease may still be alleviated and life prolonged by mercury pushed often so as to affect the mouth. In this form of ascites the patient suffers greatly from abdominal pains, which can only be relieved by hot bottles or fomentations. In these cases, also, the bowels are often greatly constipated, and require the most powerful drastic purgatives, as the black draught, castor or croton oil, or elaterium. In this form of dropsy, however, the peritoneum partakes more of a cyst than in most of the others; the water is therefore seldom reduced, and the patient generally requires the last imperfect resource of the art, or tapping.

Ascites depending on enlarged spleen is also difficult of cure. If the spleen be simply hypertrophied, the bromide of potash, in doses of five to eight grains three times a day, is perhaps the most efficient remedy, and after that the iodide of potassium. The patient, however, often falls from hæmorrhage after all the more prominent symptoms have been relieved.

The dropsy which often occurs in young chlorotic women, in which the urine *contains albumen*, the kidney, being healthy in structure though disordered in function, is generally cured; and the remedies which are most efficient are salicine gr. x. ter die, or else the bitartrate of potash, ʒ j. ter die. The former is a mild tonic, has considerable power in restoring menstruation, and likewise acts on the bladder. The cream of tartar also is an excellent remedy, both as a diuretic and as a purgative in these cases.

Ascites, however, with *albuminous urine*, and depending on the *granular* kidney, as it is the most common form of dropsy so it is the most intractable. The difficulty of the treatment is also enhanced by the fact that the remedy which succeeds with one patient will often entirely fail in another exactly similar case, while a large class of these patients are not beneficially influenced by any treatment yet proposed. The most general rules we can lay down are as follows.

Many practitioners, from the number of secondary inflammations which follow in the train of albuminous dropsy, have considered this disease to be inflammatory, have termed it '*inflammatory dropsy*,' and consequently have recommended bleeding as the cardinal point on which the treatment turns. It should be remembered, however, that inflammation is as assuredly produced by defect as well as by an excess of nervous excitement. In albuminous urine dropsy, therefore, the blood is impoverished by the loss of a considerable portion of its albumen, and consequently it seems to follow that the inflammation is of an asthenic character, and, so far from being controlled by bleeding, is likely to be rendered more intense and fatal by that operation. The profession, however, is divided on the subject: Dr. Blackall, Dr. Christison, and Dr. Elliotson recommend bleeding: Dr. Bright uses the lancet with extreme caution, while many able practitioners forego its use altogether. In general bleeding does not diminish the quantity of serum in the urine, while it enfeebles the patient, even when young and of considerable powers of constitution. It may not do all the mischief that might have been expected from it, but it certainly does not do the good that has been attributed to it.

With respect to remedies, by far the greater number that recover are cured by the bitartrate of potash, or by similar remedies, as the binoxalate of potash, or the oxalic acid. The irritable state of the bowels in this disease hardly allows large doses of these medicines to be employed; and a drachm of the bitartrate of potash three times a day, or ten grains of the binoxalate of potash, or of oxalic acid, also exhibited the same number of times in the day, are as large doses as the patients will generally bear, and even in many of these cases a grain of opium is necessary at night to enable them to continue their use. The action of these diuretics is often much assisted by some vegetable or mineral tonic, as the ferrum tartarizatum, of which ten grains may be given three times a day, or else the salicine, of which ten grains also may be given at similar intervals.

When the superacid salts fail, the patient is not to be abandoned, for by some inexplicable affinity or susceptibility, other remedies will occasionally take up the disease. Thus one patient, in whom the bitartrate of potash failed, was recovered by salicine, gr. x. ter die. Another, in whom both the bitartrate and salicine had failed, was cured by the dried seeds of the iberis amara, gr. iij. to v. ter die;—others again are relieved by squills; and others, perhaps, by the bryony root. When the bones have been diseased, the iodide of potassium has cured the disease; while in affections of the heart, digitalis has occasionally emptied out the patient. These are isolated instances of success, still they ought to induce us not to abandon the patient unless after trying an extensive series of substances, and happily by perseverance other medicines may be discovered still more beneficial in this fatal disorder.

As yet nothing has been said with respect to mercury, a well-known and powerful agent in the cure of inflammation, and which has been extensively used in albuminous urine dropsy. In some very few instances it may have cured the disease, and in a few more relieved the patient; but in general, if the water has disappeared under its use, this subsidence has been the immediate forerunner of death. Again, the majority of patients are so susceptible of the action of this metal, that they have fallen into most profuse ptyalism, large portions of the jaw have exfoliated, and they have at length sunk, after much deplorable suffering. Among the negantia in this disease then are bleeding and mercury, and to them may be added elaterium and cantharides.

Such is the general treatment of this disease, but there are many particular symptoms in its course which require to be combated, and which we have often in our power to alleviate. *Chronic vomiting* is one of the most distressing concomitants of this affection, and is to be met by the effervescing draught, combined with ♏ j. or ♏ ij. of hydrocyanic acid, or with ♏ iij. to ♏ v. of tinct. opii. One or two drops of creosote out of an aromatic water may also be tried. These are perhaps our most efficient remedies in this complaint; "but the physician," says Dr. Christison, "ought not to be surprised if he finds all these remedies ineffectual." It is this tendency to chronic vomiting which renders the propriety of administering squills so doubtful in this disease.

Diarrhœa is common in this disorder, so that it is almost always necessary to combine the purgative salt with some opiate; and sometimes the bowels are so singularly irritable as to oblige us to abandon all opening medicine, and to prescribe astringents, as kino, catechu, or hæmatoxylum, or else the mistura cretæ composita c. opio, and even pure opium, to the amount of two, three, or four grains a-day; and in addition to this the patient should be supported by small quantities of wine or brandy. Dr. Christison speaks highly of the acetate of lead in these cases; but under any treatment this symptom is dangerous and distressing.

Inflammation of the peritoneum, when combined with albuminous urine dropsy, presents likewise great difficulties in its treatment; for if the patient be bled he is often not relieved, and if that operation be neglected, he most commonly dies. The usual treatment of this symptom is by leeches, fomentations, mercury, and opium.

Inflammation of the pleura presents the same difficulties as peritonitis, every present mode of treatment being most unsatisfactory. Œdema of the lung, or effusion into the cavity of the chest, are also generally fatal occurrences, and without remedy. The bronchitis is perhaps best treated by blisters, anodynes, and small doses of squills. The affections of the heart in this, as in all other forms of dropsy, are exceedingly intractable; but iberis, digitalis, with or without æther, for the patient generally requires support, and also occasional small bleedings, if hæmoptysis should occur, are those remedies which usually give most relief.

In the chronic headache, with which the patient is often troubled, small doses of arsenic, as one-twentieth of a grain three times a day, have several times removed it. When effusion takes place into the cavities of the brain and of the arachnoid, the patient's state, whatever be the modes of treatment employed, is generally hopeless.

The treatment of the various forms of ascites that have been detailed, though often successful, yet is frequently inefficacious, the peritoneum partaking more and more of the properties of a cyst, so that the abdomen becomes greatly distended, anasarca of the legs extends upwards to the thighs and trunk, while the scrotum is distended almost to bursting. Something more then is often necessary to be done to relieve the patient; and we have it in our power to draw off the water by tapping the abdomen, or by scarifying the legs, or by puncturing the scrotum. In making this choice, however, we are surrounded with difficulties; for the operation of paracentesis is not lightly to be hazarded, since it rarely cures the disease in its simplest forms; and when it is connected with disease of the heart, the liver, or the kidney, the relief is but temporary, for in a few hours the patient rapidly fills again, and becomes more distended than before. The operation also diminishes the chances of ultimate recovery; for unless the patient recovers, the peritoneum is rendered greatly more insensible to the action of remedies, while peritonitis may follow, and at once destroy the patient. Still, notwithstanding these adverse chances, the patient's state is often so deplorable, and he so earnestly entreats for the operation, that there are cases in which it is justified.

Scarification of the legs, or puncture of the scrotum, is apparently a much more simple and harmless operation than paracentesis, no vital organ or tissue being immediately injured, while the drain of water is often considerable. These advantages, however, are completely counterbalanced by the very constant occurrence of inflammation, at least in London, after these operations. If the scrotum be punctured, the inflammation usually begins in the skin, extends to the cellular tissue, and at last involves the testicles, and the pain in these cases is not only severe, but amounts to agony. Nor is the patient relieved, except by the supervention of gangrene; and even if gangrene takes place, the skin often survives the death of the cellular tissue, so that the agony is little mitigated, and thus he often dies in horrible torments. Scarification of the leg is also very generally followed by inflammation, also terminating in gangrene; but although the actual suffering in this case is less severe than in the former, still it is often agonizing, irremediable, and accelerates the death of the patient. No law is perhaps better determined in medicine than that of not scarifying, unless in some extreme cases, either the legs or scrotum of a dropsical patient. It has been thought that a minute puncture, as with a needle, would obviate this difficulty; still, if a puncture be large enough to allow a drop of fluid to escape, the parts over which it flows become irritated by its acridity, and inflammation follows, perhaps as soon and as severe as when a larger opening is made. It has been attempted to explain this phenomenon by affirming that the effused fluid contains urea, and has therefore the properties of urine. This may be probably the case, but it lies without action in the sound cellular tissue, which urine would not do; while urine which flows over the healthy skin leaves little trace behind.

Hydrops Ovarii—Ovarian Dropsy—

Is an effusion of a watery fluid into one or more cysts formed in the ovary, and is a disease known from the earliest antiquity.

Remote Cause.—The remote cause of this form of dropsy is hardly known, so that it probably arises from slight causes acting upon a particular idiosyncrasy. Its more obvious causes are mechanical injuries, as well as all those causes which act upon the uterus, producing menorrhagia or amenorrhœa.

Predisposing Causes.—It is doubtful whether any case is known before puberty; but Franck mentions having seen a young person of thirteen years of age labouring under this disease, and Stard one of fourteen. It sometimes occurs between twenty and twenty-five, but is most common towards the period of the cessation of the menses, and from that period till sixty. It occurs in the unmarried as well as in the married female.

Pathology.—The seat of this disorder is supposed to be the Graafian vesicles, or else the cellular tissue which connects them, or perhaps both. These vesicles, or cells, probably by a process of achromatous inflammation, form cysts, which secrete a fluid like water in much greater abundance than it is absorbed, so that it acts as a distending force, which slowly augments, till at last the cyst or cysts acquire an extraordinary size, containing many gallons. The walls of the cyst are at first transparent; but as the disease advances they become thickened, opaque, and of considerable tenacity, so much so, that in some instances they are cartilaginous, and in others osseous. The size of these cysts is often so great that they rise above the pelvis, thrust the liver and spleen into the chest, and at length fill the whole abdomen.

The number of these cysts is very various, but most commonly there are from three to six, and even many more. They are very uniformly of different magnitudes, and in general the largest occupies the anterior portion of the ovary. Examined externally, the tumor is irregular and knobbled from the projection of the smaller cysts. When the disease is advanced, nothing is more variable than the nature and quantity of fluid these cysts contain. Often in the same ovary there are as many different fluids as there are cysts; one being filled with serum; another with a fluid like thin honey and water; a third with pus; and a fourth, perhaps, with a fluid like chocolate grounds, or blood, more or less modified. It is the great density of many of these fluids which causes the tumor often to feel hard and to be void of fluctuation, and consequently sometimes to be mistaken for fungus hæmatodes, or other solid substance.

The quantity of fluid which these cysts contain is as various as its quality. At first the cyst is small, and its contents hardly exceed a drachm; but in advanced stages of the disease the cyst has been known to hold 120 and even 140 pints, much exceeding, perhaps, the entire weight of the woman's whole body.

On examining the body after death, we usually find some fluid effused into the cavity of the abdomen; the cyst also often adherent to the walls of the abdomen, and the intestines glued together in consequence of the inflammation caused by the great pressure. If the patient has fallen after tapping, the inner walls of the cyst are often actively and extensively inflamed, and perhaps filled with pus. It is seldom that both ovaries are found diseased, and in a very few instances the cyst has been found pediculated, or else formed in the Fallopian tube.

Symptoms.—The early stage of ovarian dropsy is often little marked, and the disease silently forms without any symptom, or only some slight uneasiness in the ovarian region, and in a very few instances by some occasional attacks of severe abdominal pain, probably from the setting up of adhesive inflammation.

In this incipient stage the tumor is often long stationary, but at length it rises above the pubes, and then it may rapidly or slowly enlarge, till it fills the whole abdomen. The general health is also rarely impaired till the tumor attains an inconvenient size, and presses upon and displaces the surrounding viscera; under these circumstances the urine, which was passed naturally as to quantity and as to time, is either long retained or voided frequently. Pain also is felt in the loins and down the thighs. The bowels are costive, and the catamenia either irregular or suppressed, and, from the general debility, the patient towards the close of the disease becomes hysterical. Besides these local symptoms, the legs become anasarcous, and ascites is at length added to the original affection. Under this general impairment of the functions of the different viscera, the health of the patient sinks, she is unable to lie down from her unwieldly size, the powers of life are exhausted, and death puts a period to most protracted suffering.

The whole duration of this affection is very various, or from a few months to two, three, or four years.

Diagnosis.—This disease is to be distinguished from hydrops uteri only by an examination, and from encysted dropsy of the liver, or other encysted dropsy of the abdomen, only by its situation. The greatest difficulty, however, is to distinguish it from fungus hæmatodes of the mesentery; for when the fluid in the ovary is of much density there is no fluctuation, and the sensation it gives is that of a solid body. The fungoid tumor, however, generally forms higher up and more in the centre of the abdomen, and is thus distinguished by its locality.

Prognosis.—A very few cases have been supposed to have recovered from ovarian dropsy; such instances, however, are only exceptions to the general fatality of the disease, and consequently the prognosis is uniformly most unfavourable.

Treatment.—The profession generally are perhaps more agreed upon the entire nullity of all remedies in the cure of ovarian dropsy than perhaps on any other fact in practical medicine, and are almost universally of opinion, with Dr. John Hunter, that the patient will have the greatest chance of living longest who does the least to get rid of it. The medical treatment is, therefore, almost limited to obviating symptoms, regulating the bowels, and increasing the flow of urine so as to keep down the anasarca and ascites which are so commonly present.

As the medical treatment of ovarian dropsy is at present only palliative, paracentesis in some instances becomes imperative, owing to the urgency of the symptoms. This operation, however, should be delayed as long as possible, from the multilocular nature of the cyst; for supposing one cyst to be emptied, there are in general several others quite out of the reach of the trocar. It should also be delayed from the danger of inducing inflammation in the cyst itself, and thus distroying the patient with tenfold suffering. Under the most favourable circumstances, also, the fluid soon collects again, and the patient is thus obliged to submit to a frequent repetition of the operation. One patient mentioned by Morand underwent 30 operations in 25 years, and had drawn off 6600 lb., or perhaps 60 times her own weight. Another instance, a Mrs. Mumford was tapped 55 times in four years.

It has been proposed, after tapping, to effect a radical cure by laying open the tumor, or by keeping a canula inserted in it; but as very few cases are mentioned as having recovered by this practice, the multilocular nature of these cysts, and the danger of inflammation, must ever prevent the humane physician from recommending it.

Besides tapping the cyst, the extirpation of the entire ovary has been proposed, and, as it appears, has been successfully performed by L'Aumonier of Rouen, and by Drs. Smith and Macdowal of the United States. The operation proposed has been an incision through the walls of the abdomen, and then raising the sac to eradicate it by ligature or other means. This practice has been repeated in this and other countries by Blundell, Lizars, Dieffenbach, and others, but, except in one instance, it has entirely failed. In three cases the patients died of the operation, and in a fourth the surgeon did not proceed with the operation, finding the tumor adherent on all sides. Mr. Walne, however, has very recently performed this bold operation, and with success, in two cases. Another mode of curing the patient is by acupuncturation, which M. Bonfils recommends, and states that it has in some instances been successful. This operation is entitled to a more extended trial than has yet been given it, for the generally multilocular nature of these tumors renders it hardly possible that tapping should be in any instance ultimately successful.

When these methods have either been rejected or failed, a last mode of relieving the patient is by puncturing the legs, which are often greatly swollen, rendering it impossible to flex them. The operation in this case is liable to even greater objection than in ascites; for, besides the punctures very commonly inflaming, the relief by this method must be very trifling, while the chance of a cure is entirely hopeless.

The treatment of ovarian dropsy presenting so few chances of success, it is grateful to be able to add, that in a very few cases a spontaneous cure has taken place. Dr. Baillie mentions an instance of its spontaneous disappearance after it had existed three years, the patient remaining subsequently in good health. Instances have occurred to Dr. Elliotson, to Dr. Montgomery, to Dr. Copland, and others, of the tumor having formed adhesions to the intestines or to the vagina, and rupturing, and thus discharging its contents into those cavities; and Dr. Seymour mentions a case in which the tumor burst into both canals, and recovery took place. The ovary has sometimes also formed adhesions to the abdominal parietes, and has burst externally, and the patient recovered. Dr. Blundell has, in his published lectures, given a case of rupture into the cavity of the abdomen, and of the patient being restored by absorption of the effused fluid.

Dropsy of the Fallopian Tube.—A cyst sometimes forms in the fold of the ligament, either near the uterus, or near the ovarium, or near the fimbriated extremity of the tube. This disease has been described by Drs. Baillie and Monro. The cyst thus formed is quite as large as that of the ovarium, Cypriani having found one that contained 150 pints, and Hardie another, only something less, or 140 pints of fluid. No distinction can be made either as to symptoms, course, causes, or treatment, between this disease and ovarian dropsy.

Hydrometra—Dropsy of the Uterus.—This disease is of very rare occurrence, and will be better illustrated by a case than by any general description. The following instance is related by Dr. A. T. Thompson, in the *Medico-Chir. Transact.*, vol. xxiii. p. 170.

Mary Rae, at 65, the mother of several children, was admitted into the infirmary in Dec. 1823. She appeared as large as if six months gone with child. It was suspected she was labouring under a diseased ovarium, and an indistinct fluctuation was perceptible in the tumor. There was, however, a greater derangement of the system than usually attends dropsy of the ovarium, as loss of appetite, considerable nausea, furred tongue, quick and feeble pulse, the bowels irregular, and the urine scanty and high-coloured. She died in March, 1824, after amputation of the leg, which operation was performed in consequence of a dry gangrene which had attacked the limb. On dissection the tumor was ascertained to be the uterus greatly enlarged and filled with fluid. It was partially sphacelated on its peritoneal covering at the upper portion of the fundus. On making an incision into it, eight measured quarts of a dark-coloured fluid, which coagulated slightly when heated in a spoon over the flame of a candle, issued from it. The internal surface of the organ was not more irregular nor more spongy than in its natural state, but none of the orifices could be found, for even the os uteri was, interiorly, as completely obliterated as if it had never existed; and although its situation could be traced in the vagina, yet even there it was very faintly marked. In this case the bladder was so stretched as to extend to within an inch of the umbilicus, and must have been perforated by the trocar had any attempt been made to perform the operation of paracentesis.

CLASS II.

Of Diseases of Structure.

However fertile a source of illness and of painful suffering the large class of the Neuroses may be, still, of the 340,000 to 350,000 deaths which annually take place in England and Wales, there can be no doubt that upwards of 300,000 are caused, either primarily or secondarily, by diseases of structure, including those produced by the class of morbid poisons. The diseases of structure are, therefore, of vast importance, so much so that many pathologists have considered them as constituting the whole body of medicine. It is proposed now to divide them into four great divisions; the 1st embracing Inflammations having no specific character, also Malaxoma, Scleroma, Atrophia, and Hypertrophia; the 2nd, Tuberculoma; the 3rd, Carcinoma; and the 4th, Melanoma.

It is also proposed to give the general laws of inflammation, of the formation of cysts, of hypertrophy and of atrophy under one head, in order not to break this short treatise into too many parts.

Order I.—Of Inflammation.

Nature repairs the injuries of organized substances in two different ways, or by reproduction and by inflammation. In the vegetable kingdom and in the lower classes of animals the power of reproduction is considerable, a part sometimes reproducing the whole vegetable, or the whole animal; but in man this power is extremely limited, or to the hair, the nails, and the cuticle; for an eye destroyed, or a leg amputated, is never reproduced, the wounds thus occasioned being healed by inflammation. Every part, therefore, or nearly so, being liable to injury, is provided with a *power* of inflammation, and on this property the surgeon relies for reuniting the tendon he divides, for obliterating the artery he ties, and for healing the wound he makes. This power of inflammation, however, is destructive as well as preservative, and is liable to be excited by many other causes than mechanical injuries, or by the numerous class of morbid poisons, by intemperance, the play of the passions, atmospheric vicissitudes, and other circumstances. Inflammation, consequently, has many causes, is of very frequent occurrence, and as it affects every organ and every tissue of the body, is of such extent as to form one of the most prominent features in medicine, and opens a wide field of study and of practice to the physician.

Of the essential conditions of inflammation we know nothing; for we are no more able to assign the reason why a part should secrete lymph, or serum, or pus, than we are why the stomach digests or the liver secretes bile. All we are able to do is to determine the conditions necessary to the existence of this power, and to determine and to generalize its phenomena.

The conditions necessary to the existence of inflammation are one of two things, or else both conjoined, namely, a morbid action or condition of the nerves of the part, and also a morbid state of the fluids. Majendie has shown a morbid state of the nerves will produce inflammation, for he divided the fifth pair of nerves high up in the cranium, when the eye of that side, supplied by a branch of that nerve, inflamed and was destroyed. Again, if, instead of dividing the nerve, we make pressure on it, as by passing a ligature round a part, inflammation still takes place, the part separates into two, and the ligature comes away. Also, if from any cause the spinal cord be diseased, so that the nervous influence of the brain is interrupted and prevented reaching the lower portions of the body, the patient very constantly dies of inflammation of some part below the point of obstruction. It is plain, therefore, that a morbid state of the nerves is one cause of inflammation.

It is equally certain that a morbid state of the fluids will cause inflammation; for if we inject any putrid substance into the veins of an animal, the animal dies of inflammation of the lungs, or bowels, or other part; or if there be any other poison which produces inflammation, as arsenic, let it be injected into the veins of an animal, and it dies of inflammation of those parts for which the poison has an affinity. Majendie has likewise shown that a mere alteration in the proportions of the blood, as the lowering of its quality, is a cause of inflammation. Thus, he took blood from a dog, and having removed the fibrine, re-injected the serum into its veins, when the animal died of pneumonia, so complete that its lung having been laid by the side of one taken from a person that had died of influenza, their pathological states could not be distinguished from each other. Also the same physiologist found, on feeding animals on sugar, that the impoverishment of the blood thus produced was first manifested by inflammation and loss of its eyes. It is proved, therefore, that not only a morbid state of the nerves, but also a morbid state of the fluids, are conditions which, taken separately or together, often determine inflammation. The worst inflammations are those perhaps in which a morbid state of both exists. As a corollary from what has been stated, it may be affirmed, if inflammation is often of a sthenic character, and arises from a too powerful nervous re-action, that it perhaps more commonly arises from debilitating causes, and is of an asthenic character.

The diseased states resulting from inflammation of course will be found in the body of this portion of our subject. The generalization, however, of the phenomena of any science, and a statement of its more general laws, are the first steps towards understanding it. Celsus was the first who attempted to define inflammation, and he affirms a part to be inflamed when it is the seat of heat, of pain, of swelling, and of redness. But this definition appears to exclude much disease that can only result from inflammation; the brain, for instance, is often softened or hardened, or, as we believe, inflamed, and yet no redness is visible. A tooth is often destroyed by caries, and yet there is no swelling; the bowels are often ulcerated, and yet there is no pain. And Mr. Hunter has shown that the heat of an inflamed part never rises above the temperature of the blood in the heart, so that the heat of the abdominal and pectoral viscera when inflamed is not greater than that of a healthy part.

The definition of Celsus being inapplicable to some large classes of inflammation, it becomes a matter of consideration whether certain products, as serum, lymph, or pus, and also certain given states of parts, as ulceration, softening, induration, thinning and thickening of parts, would not afford a better criterion of inflammation than the abstraction of the great pathologist. If this view of the subject be admitted it would necessarily lead to a division of inflammation into *chromatous* inflammations and into *achromatous* inflammations, or into red inflammations and into colourless inflammations. Of the existence of the former there can be no doubt; and as a general principle the definition of Celsus well describes them, but the latter have no less a real existence. Thus we often open a patient that has died of phthisis and find the intestine ulcerated; but so far from being redder, it is paler than natural, and so far from being thickened, it is thinner than usual. We often find the cartilages of the joints ulcerated, and yet not a trace of a red vessel. In cases of bronchitis, with purulent expectoration, if the lung be washed so as to remove the morbid product, the most minute anatomist is unable to determine whether the parts during life were in a state of health or disease. Take the arterial system, and how often do we find the aorta thickened and thinned, softened and indurated, ulcerated and its elasticity entirely destroyed, and yet not a red vessel to be seen; neither has the patient complained of the slightest sensation of pain, or any feeling of heat in the part during life. A large abscess also may form in the brain or cellular tissue, or pus may be effused into the cavity of the abdomen, and without any appearance of redness or having been preceded by any suffering.

There is no question, therefore, of the existence of achromatous inflammation, and this perhaps without any essential difference in the condition of the parts in either form of inflammation; for it seems determined, by the microscopic observations of Müller and others, that all vessels, however minute, carry red blood, but that those which admit one or at most two rows of red globules appear colourless to the unassisted eye. Whether, therefore, the inflammation be red or colourless, the same elements of the blood, though not in the same proportions, are employed in its development. If the division of chromatous and achromatous inflammations be established, a more correct definition of inflammation would be, that it is a state of parts in which the vital affinities are altered, giving rise to certain products, or states of parts: as the effusion of lymph, serum, or pus; or to ulceration, gangrene, thickening and thinning of tissues, &c.

Of Chromatous or Red Inflammations.

Chromatous or red inflammation has many varieties as to kind. Thus we have Simple inflammation, Specific inflammation, Rheumatic inflammation, and many persons speak of a Scrofulous inflammation. These varieties differ in their causes, course, seat, and results, rather than in their phenomena, which it will be necessary now to present in a generalized form to the reader.

Chromatous inflammations, of whatever kind, may be acute or chronic, and have many degrees of intensity, denominated chiefly from their terminations, which are by resolution, by effusion of serum, lymph, or pus, or else by ulceration, gangrene, or mortification; and hence they are termed

Inflammatio diffusa,	Inflammatio suppurativa,
Inflammatio serosa,	Inflammatio ulcerativa,
Inflammatio adhesiva,	Inflammatio gangrænosa.

The order in which these different forms or intensities of inflammation have been named is the order of their intensity in some tissues, but by no means in all of them. In the serous membranes, for example, the progression is correct: the diffuse inflammation being less violent in degree than the serous, the serous than the adhesive, and the adhesive than the suppurative, and so on. But in mucous membranes this order is often inverted, for it is well known that lymph effused from the mucous membrane of the larynx is a much more dangerous and fatal disease than a secretion of pus from the same part. From this circumstance the same mode of inflammation often varies in danger and intensity in different membranes. Thus suppurative inflammation, when it occurs in a serous membrane, is fatal; but when it attacks a mucous membrane, as that of the urethra or lungs, it is comparatively of little moment.

Neither are all parts equally liable to all these different forms of inflammation; for the mucous membrane of the nasal fossæ, of the colon, and of the small intestines readily takes on serous inflammation; but serous inflammation is entirely unknown to the mucous membranes of the stomach and œsophagus. Purulent inflammation is common to the mucous membranes of the lungs, of the colon, and of the urethra; but is unknown as a secretion from the mucous membranes of the stomach or small intestines, without breach of surface. The same form of inflammation, therefore, has different values, and is of different frequency in different organs and tissues. It is consequently necessary to study the phenomena of inflammation, as it occurs in each particular organ and tissue. We shall now point out a few of the more particular laws, as well as some of the general laws incident to each form of inflammation, in whatever organ or tissue it may occur.

Inflammatio diffusa is an abnormal collection of blood in the capillaries of a part, disordering its functions, and sometimes, when affecting principal organs, as the brain, causing death. It has two stages; and the circulation being in general much increased in the first stage, that is termed the stage of *active congestion*. In the second stage the circulation is in general retarded; and this stage has been termed that of *passive congestion*. In the first stage the capillaries circulate arterial blood. In the second stage, they acquire the power of converting the arterial into venous blood, and ultimately of expelling the colouring particles of the blood altogether. After this they recover their healthy tone and function, and the inflammation terminates, as it is termed, by resolution, or without the escape of any morbid product. This mode of inflammation and its various phases are constantly to be witnessed in inflammation of the white part of the eye, as in conjunctivitis. Diffused inflammation attacks every organ and tissue of the body; has in all cases a destructive tendency, and has no reparatory power, except when artificially produced as a counter-irritant.

Many physiologists have sought to illustrate the difficult subject of inflammation by exciting diffuse inflammation in the webbed foot of the frog, and in the mesentery of the rabbit. It is doubtful whether the frog is an animal liable to inflammation, but the rabbit unquestionably is; and the phenomena observed have been, that the colourless capillaries of the healthy membrane become enlarged and filled with red blood; that the velocity of the circulating fluid is at first increased, but after a time, if the inflammation is violent, the velocity is gradually retarded in the centre of greatest inflammation, till at last the circulation becomes stagnant at this point, and this stagnation, or "*stasis*," perhaps at length extends over the whole of the inflamed surface. Again, if the inflammation subsides, the circulation is gradually re-established from the circumference to the centre, the healthy affinities of the part slowly restored, the arterial blood again converted into venous blood, and ultimately the colour, circulation, and functions of the part once more become healthy and natural. This is nearly all the information acquired by microscopic observations on the subject of the proximate state of parts in inflammation generally, for beyond this the tissue becomes thickened and opaque, and a veil is cast over the further processes of nature which it has hitherto been in vain to penetrate. It is remarkable that this proximate state of parts, as far as we can trace it, is the first stage, not only to the diffuse but to the serous, the adhesive, and the suppurative inflammations; so that those different forms of inflammation evidently depend on an altered affinity of the capillaries of the part for the fluids which circulate through them, rather than on any physical difference of structure demonstrable in the part itself.

Another fact relating to diffuse inflammation, as well as to the other forms of inflammation, has been determined, or, that the larger blood-vessels of the part are enlarged and contain much more blood than usual; again, should the part not recover its healthy state, the capillary vessels are nearly obliterated, or rendered impervious, since injections do not penetrate them as in health.

As a general principle, diffuse inflammation is said to terminate by *resolution;* that is, without any product whatever being effused; but this is not strictly correct, for when the inflammation has subsided the part is generally found thickened and opaque, some deposit having taken place either in its vessels or between their interstices. Much other injury is also usually done, for if a membrane be acutely inflamed, it is very readily detached, the cohesion of its connecting tissue being rendered extremely lacerable. Again, if an organ be acutely inflamed, it is rendered soft and easily torn: while on the contrary, if the same parts be chronically inflamed, the organ becomes indurated and the membrane strongly adherent. By these changes of cohesion the elasticity of parts, a circumstance often of very primary importance, becomes greatly altered and impaired.

In chromatous inflammations also the inflamed part has some shade of red; but this redness varies according to the tissue or organ. When, for instance, a serous membrane is inflamed, it is of a bright red or rose colour. On the contrary, if a mucous membrane be inflamed, it is of a deep red or venous colour, sometimes almost black; and though the colour of these parts is often represented as of a scarlet hue, this is probably owing to the part having been exposed to the atmospheric air before the draftsman saw it; for exposure to the air changes the original tint in a very few minutes to an arterial redness. It is perhaps owing to this latter circumstance that the conjunctiva of the eye and the mucous membrane of the mouth are generally of a bright red when inflamed. In like manner the liver, spleen, kidney, or other solid organ, when inflamed, is always of a deep venous hue.

When inflammation is of any intensity the functions of secretion and of absorption are greatly impaired. Thus, in diffuse inflammation the secretions of the part are stopped, and it feels dry, while its powers of absorption are so feeble that a strong poison placed in contact with the part either lies inert in it or is only slowly absorbed. These alterations of the powers of secretion and of absorption, though not so absolute as in diffuse inflammation, yet are common in a greater and less degree to all inflammations; and is a law by which we are enabled often to apply very stimulating applications, as mercurial ointments, to a diseased part without affecting the constitution.

Serous inflammation is when *diffuse inflammation* terminates with, or is attended with, *effusion of serum*, or of the more watery parts of the blood, the effused fluid, according to Kaltenbrunner, being thrown out in jets from the sides of the capillary vessels. This affection is for the most part destructive, though occasionally, as a counter-irritant, when excited by the action of a blister, its action is reparative. In *Serous* inflammation, even of a serous membrane, as the pleura, the fluid effused is not only greater in quantity than natural, but is also greatly altered in quality. In health the serous secretions are little more than a pure aqueous vapour, with a trifling addition of saline matters; but when they result from inflammation they contain a considerable quantity of albumen, sometimes a portion of fibrine, and at others pure blood, entirely unchanged in its physical properties. The quantity effused varies, according to the part affected, from perhaps a fraction of an ounce to a few pints, or even a few gallons. Serous inflammation is unknown as a disease of the liver, spleen, or kidney, of the bones or cartilages, or of the mucous membranes of the stomach or œsophagus.

Adhesive inflammation is when lymph is thrown out, or that portion of the blood which enters more particularly into the formation of muscular fibre. In surgery, if a party receive a wound, and the lips of the wound be immediately brought together, and the blood expressed—for the presence of much blood is inimical to the operation—a layer of lymph is thrown out, which becomes organized, forms a cicatrix, and the part heals by what is termed union by the *first intention.* Adhesive inflammation is so powerful in some tissues, that not only has a nose bitten off, or a finger chopped off, united, but even a large wound caused by amputation has frequently healed in two or three days, except where the ligatures were situated. In animals, even dissimilar parts will unite, as the testicles of a cock to the inner surface of the abdomen of a hen, or a spur removed has been planted on his comb. This property of adhesive inflammation is possessed by all organs and tissues in a degree sufficient to ensure union after division, and is the great agent on which the surgeon relies in all his great operations. In medicine, however, it is roused by a great variety of causes, besides mechanical accidents, and is always of a destructive tendency; for, effused into the substance of an organ or tissue, the diseased part becomes enlarged or thickened, giving rise to a large and formidable class of disease, little influenced by treatment. Again, if effused from the surface of a membrane, canals are obliterated; parts that should have motion are bound down, or else a false membrane forms, so prone to disease that the patient seldom long survives a most imperfect recovery. Considered as a diseased action, adhesive inflammation is possessed in very different degrees by different organs and tissues; thus lymph is often poured out in great abundance into the substance of the lungs, but in the liver, brain, spleen, or kidney, it seldom exceeds slight interstitial deposit. It is also frequently poured out in the greatest abundance from the serous membrane of the abdomen or chest, but it is infinitely less abundant from the serous membranes of the brain. It is common and abundant from the mucous membrane of the colon and larynx, but is hardly known as a secretion from the similar membranes of the stomach, œsophagus, or small intestines.

When adhesive inflammation takes place from a membrane, the lymph effused must act as a foreign body, inducing or keeping up a most destructive disease, unless it be removed or become organized. In serous cavities to remove it is impossible, and nature consequently adopts the latter process; first, as a means of fixing it and rendering it as harmless as possible; and again, by rendering it a living part to render it liable to be removed by absorption. The time of incipient organization after effusion is probably very short, and has been demonstrated by Mr. Hunter to have commenced as early as the 26th hour after the Cæsarian operation. Mucous membranes having an external outlet, the lymph effused can readily be removed, and has a ready exit. Nature, therefore, seldom induces the organization of lymph in these parts, but casts it out, so much so that organization of lymph, except in some of the smaller canals, is hardly known.

Suppurative inflammation is that process by which, in surgery, foreign bodies—a piece of detached bone, or a splinter, is removed from the system. In medicine it is always destructive, and may be either a further stage of the preceding inflammation, or it may exist *per se*. Pus, the peculiar fluid now formed, is globular, specifically heavier than water, has a sweetish mawkish taste, is of a peculiar odour, and is of a cream colour. This fluid varies greatly in quantity and quality in the course of the same or different diseases, being greatly influenced by the health of the patient; or it may be said to vary from a laudable pus to a mere ichorous sanies. Pus also, besides possessing certain chemical properties, may also possess certain specific animal properties: thus it may be impregnated with certain poisons, as that of syphilis, or of the small-pox; it is also often loaded with many foreign matters, as urate of soda, &c.

Pus, when secreted by a sound membrane, has no known beneficial property; but when secreted at the surface of an ulcer, or open abscess, it affords considerable protection to the tender granulations, acts as a temporary cuticle, and sometimes forms a crust, but not constantly so, under which the parts heal. The origin of pus is a peculiar action of the vessels of the part, by which the particles of the blood are converted into pus. Some physiologists have supposed pus to be the red globules morbidly changed and enlarged; but the quantity of pus poured out, often exceeding a pound weight a day, and this for many weeks or months together, renders this hypothesis impossible. Pus is consequently a new formation, and in some cases appears to be extensively absorbed. Andral has collected blood from the dead body and found globules of pus; so that it exists in the circulating fluid, under certain circumstances, is beyond all doubt.

Pus is daily seen to be poured out from a sound serous or mucous membrane, and from the surface of ulcers; but it may also be formed into an abscess, and the abscess may be either *phlegmonous* or *infiltrated*, and in the former case there are many different varieties or modes of formation.

A phlegmonous abscess is when the pus is collected into one cyst, and is prevented from escaping by condensation of the surrounding tissues. The formation of this kind of abscess is very various in different diseases. In the formation of phlegmonous abscess the vessels of the inflamed part are first injected with red blood proportioned to the violence of the disease; this blood at length bursts from the containing vessels, and diffuses itself throughout the inflamed portion of the organ, and combines with its tissues. The tumor now feels hard, but nevertheless its texture is tender, easily broken down, and, if the inflammation now proceeds, pus is poured out first in small *foyers*, but which at length unite and form the abscess, the red pulpy mass being either absorbed or else changed by an ulterior process into pus. If the abscess be now allowed to ripen, a membrane of greater or less tenacity forms, and lines the entire cavity; the functions of this membrane are not confined to containing pus, for it most probably imparts to that fluid an obscure vitality, and gives it freedom from putrefaction; it is also an organ of secretion, and of absorption, and by its means the quantity of pus is increased or diminished, and its quality rendered more or less healthy. This membrane is united by a close sympathy with the constitution, and feels in a rapid manner its slightest changes; for when enfeebled from any cause, the contents of the abscess from laudable pus often become an ichorous and offensive sanies; while on the contrary, if the health improves, an ichorous sanies becomes laudable or healthy in a most remarkable manner; in a few instances the contents of a large abscess are sometimes absorbed by this membrane.

The above description of an abscess is generally true, but it is certain, also, that this process greatly varies in different tissues, and even in the same tissue. No one, for instance, can fail to observe a striking difference between an abscess of the liver and that occasioned by a boil or carbuncle. In the former the parts have undergone a general softening, and are converted into pus; while in the other the process of *ramollissement* has been so partial, that a hard and solid core is amongst the first products discharged. A small-pox pustule is an abscess, but how different its phenomena from either of the former; first a hard tumefaction, then a vesicle filled with serum, and this is subsequently changed for or into pus; it seems therefore proved that the phenomena of phlegmonous abscess are not uniform in the same, and much less in different tissues.

When an abscess points externally, the solid parts forming the outward barrier are softened, thinned, and ulcerated, till at last nothing remains to oppose the escape of the pus except the cuticle, which at length ruptures and the pus is discharged.

The walls of a phlegmonous abscess, it has been stated, are always so condensed by inflammation of the surrounding tissues, that the pus is prevented from escaping. When, however, the pus effused is neither limited by a proper membrane nor by any condensation of the surrounding parts, it permeates the limb or organ by its own gravity, and is termed *a diffuse abscess*.

The incipient formation of the diffuse abscess is probably not dissimilar to that of a phlegmonous abscess, but as the inflammation is of a lower character all the processes are less complete; thus, no adhesive inflammation circumscribes the limits of the abscess, nor does any membrane form to contain the pus. The process of *ramollissement* is also imperfect, so that the abscess often contains shreds, or even large portions of mortified or loose cellular tissue. The pus secreted is also less healthy, is thinner, and less perfectly elaborated, containing a larger portion of serum, and oftentimes portions of loose lymph without a trace of organization. The pointing of this form of abscess differs also from that of the phlegmonous abscess, for the pus readily passes from its original seat by infiltration of contiguous portions of healthy membrane, and, gravitating towards the most depending position, presents a soft broad surface without any indications of pointing.

Such collections of matter are always of greater extent than phlegmonous abscesses, for the free transmission of pus from part to part occasions a great extension of the original disease. When these diffused abscesses are opened, the phenomena which result depend very much on the nature of the opening. "I have," says Mr. Hunter (note, p. 395), "seen large lumbar abscesses open of themselves, on the lower part of the loins, which have discharged a large quantity of matter, then closed up, then broke anew, and so go on for months, without giving rise to any disturbance: but when opened so as to give a free discharge to the matter, inflammation has immediately succeeded, fever has come on, and from the situation of the inflamed part as well as from the extent, death in a very few days has been the consequence." The same result has also occurred from opening *large* diffuse abscesses in other parts. In erysipelas, however, which so often gives rise to this form of abscess, a free opening is often necessary to allow of the escape of the portions of loose cellular tissue they contain.

Of *Ulcerative* inflammation there are three forms, as suppurative ulceration, serous ulceration, and dry ulceration. Most sores are instances of the first, the effects of a blister are instances of the second, and the last is sometimes seen in syphilitic maculæ, when a process of slow ulcerative absorption goes on without a trace of fluid of any kind being effused. All tissues are not equally liable to ulceration. The muscular tissues are less so than the adipose, and the adipose than the cellular tissue. It is from the operation of this law that abscesses sometimes point at very distant parts, as a lumbar abscess in the groin, and thus many important parts are for a time saved.

Granulation is an union of parts by "second intention," and is always reparative. Granulation has two forms, or granulation with suppuration, and granulation without suppuration. The first is extremely common. The latter is occasionally seen in the healing of syphilitic maculæ; and Mr. Hunter conceives he once met with it in the union of a broken thigh-bone.

Granulation, according to Mr. Hunter, results from an exudation of lymph, into which old vessels extend, and new ones are formed, and a new surface results, which is "granular"—the granule, in the opinion of modern physiologists, being a small conical tumor, or growth, composed of a mesh of terminal loops formed by the capillary vessels shooting into the effused lymph. The figure and colour of the granulation, says Mr. Travers, are determined by the state of the circulation; when that is feeble and inclined to stagnate, the granulation is broad, flat, and spongy, and either pale or of a livid hue; when, on the contrary, it is vigorous, the granulation is conical or acuminated, and of a bright red tint. The vessels prolonged into the granulation are more or less tortuous, and so numerous as to require a high magnifying power to exhibit their distinctness after successful injection. These vessels become contracted to obliteration as the period of cicatrization approaches. Granulation may take place from a surface, or from the sides of an abscess. If from the cutaneous tissue the sore heals by a process of skining; the skin, according to Mr. Travers, always springing from the edges of the wound, even in cases when the new tissue first appears in the central parts. Again, if granulations spring from the walls of an abscess, their opposite surfaces for the most part unite. Granulations sometimes form most rapidly, for Mr. Hunter has seen, after trephining a patient, the dura mater strongly united to the scalp in 24 hours. Granulations, however, have not in all cases an equal disposition to unite. Thus the granulations of fistulous abscesses are little prone to adhere, their surfaces being often as difficult to unite as those of a mucous membrane; indeed it is often impossible to produce adhesion except by exciting a considerable inflammation. A part having healed by granulation uniformly contracts. This contractile force is so great that although the sore made by the amputation of a thigh is seldom less than seven or eight inches in diameter, yet the cicatrix left on healing is hardly more than a crown piece. It is from this cause that we always find in viscera that have been the seat of abscess a marked depression at the point of cicatrization.

With respect to the granulations themselves, there is no question of their being furnished with nerves, absorbents, and secretory vessels, for the part is pained when touched; pus and lymph are secreted, and poisons, as mercury or arsenic, are absorbed by them; and although they are not powerfully absorbant, yet such quantities have sometimes been taken up as to have caused the death of the patient.

The reproductive energy of granulation, however, is not great, for it is rare that the original tissue is reproduced. No fat, for instance, is regenerated in ulcerated adipose tissues; a muscle being divided unites by a cellular cicatrix, no muscular fibre being reproduced, and a divided cartilage unites by a ligamentous, but not by a cartilaginous tissue. The skin, when destroyed, may be reproduced, yet generally it is imperfect, for after small-pox the rete mucosum is either slow in forming, or never forms at all, so that the pit remains whiter than natural. The reparation of the mucous membrane is equally imperfect, the villi being always wanting. The reparation of a flat bone, as the cranium, is so slow that 10, 20, and even 50 years pass away before a small trephine hole is filled up with bony matter. In like manner a healed cavity of the lungs is always marked by a cicatrix of cellular tissue, altogether different from the original structure; neither, as far as we know, is the fibre of the liver, of the spleen, or of the kidney restored. It is doubtful whether a divided nerve is ever united by nervous matter; many pathologists think not, but conceive that when a part has recovered its sensation or motion, after such an operation, that a cellular cicatrix of extreme tenuity forms, through which the nervous fluid can penetrate,—that fluid, like electricity, having possibly a striking distance.

It is a law also of all cicatrices, that the newly formed part is harder and of greater density than the original structure. Muscle, for instance, unites by coarse, dense, cellular tissue; tendon by bone; and bone after a fracture is a more compact substance, and contains more phosphate of lime than before the accident; but, notwithstanding this addition, the new bond of union is not so strong, nor the living principle so energetic, as in the original structure; for when the constitution has been enfeebled by severe disease, an old sore has been known to open, and the ends of a once broken bone to separate. It is equally a law that a part having been once inflamed, the liability of the part to that form of inflammation is greatly increased; and also when new membranes or tissues have formed, that these tissues are infinitely more prone to every form of disease than the original membrane.

Mortification is the death of a part, and may be complete or incomplete. In the soft parts the former is termed sphacelus, and the latter gangrene; while in hard parts, as the bones, there is a similar distinction, or into caries and necrosis.

Mortification of the soft parts may be white or black, humid or dry. Black mortification is when the venous blood is extravasated through the walls of the blood-vessels into the affected tissues, giving to the part a purple or black appearance, while to the touch it is soft, inelastic, and doughy. White mortification is when, by the action of cold, the blood has been driven from the part, and the part subsequently freezes perfectly white; but, although frozen, the vitality of the part is not destroyed, for it can be recovered by proper treatment; on the contrary, if the treatment be indiscreet, as warmth suddenly applied, it thaws, re-action takes place, the part becomes immensely swollen and inflamed, and is ultimately destroyed.

Humid mortification is when the blood transudes in a fluid state, and after its exudation probably separates into its constituent parts, so that the serum set free raises up the cuticle in bladders, forming what are termed phlyctænæ: air is also not unfrequently contained in the phlyctænæ, generated by a process of commencing putrefaction, giving to the finger touching the part a sensation of crepitation.

Dry mortification is a rare disease, and is supposed to be caused chiefly by the ergot of rye, but this is probably an error. In the year 1716, dry mortification appears to have been to a certain extent epidemic at Orleans, 50 cases having been treated at the Hôtel-Dieu of that city. Dodard has described it as beginning generally in one or both feet, with pain, redness, and a sensation of heat or burning like that produced by fire. At the end of some days the part became cold, as black as charcoal, and as dry as if it had been passed through fire. Sometimes a line of separation was formed between the dead and the living parts, and the complete separation of the limb was effected by nature alone, and in one case the thigh separated in this manner from the body at the hip joint. In other cases amputation was necessary. Mr. Solly has given an interesting case of this description, which occurred in the practice of Mr. Bayley, of Odiham. The party was a child 3 years and 7 months old, from whom both arms were removed, by this spontaneous process of nature, above the elbow, the left leg below the middle of the thigh, and the right foot above the ankle joint, being a remarkable instance, in modern times (*R. M. C. Trans.* vol. xxii. 23), of this destructive disease.

The bones, the brain, the lungs, the liver, the spleen, and the kidney, are all liable to sphacelus and gangrene; so are the different tissues, as the cellular and cutaneous tissues, the nervous and serous tissues. The muscles, tendons, aponeuroses, and blood-vessels, are likewise all liable, but in a less degree, to these formidable affections, which are sometimes the effect of inflammation, and again are in some instances idiopathic.

The pathology of the soft parts has been carefully studied in mortification, but little more has been discovered than what has been stated, or extravasation of blood, and its coagulation in the capillary, as well as in the larger vessels, together with great softening of the tissues of the part. The extent to which the coagulation extends in the large vessels is often great; for incisions made during life, four inches above the apparently dead parts, have in some instances not been followed by hæmorrhage.

Of the Constitutional Effects of Chromatous Inflammation.

There is so close a sympathy existing between the different organs and tissues of the body, that the functions of one being subverted or disturbed, the rest more or less generally fall into disease. Every local inflammation, therefore, of any intensity creates a shock which deranges remote and distant parts, and which is termed the *constitutional* affection. In the present state of medicine it is impossible to unveil the mysterious laws of the nervous system by which the different effects are conjoined, but some authorities suppose the morbid impression is transmitted by the nerves of the part, in slight cases, to the nearest nervous centre, in severe ones, to the brain, whence it may be transmitted to the system generally, causing headache, nausea, or diarrhœa, phenomena which they imagine to be caused by a simple affection of the solids. On the contrary, there are other physiologists who conceive these same phenomena to be caused by matter absorbed from the wound, and therefore to result from a contamination of the fluids. All theory apart, however, the constitutional affections may be limited to a mere affection of the pulse; to a disturbance of the alimentary canal, causing loss of appetite, sickness, diarrhœa, or constipation; to an affection of the liver, or of the brain, or chord, as when a trifling wound is followed by tetanus. These sympathetic affections, however, whether taken separately or conjoined, do not denote any particular form of inflammation, neither do they mark any particular seat of inflammation, for a whitlow is as likely to produce any or all of them as an abscess of the liver. There is one law, however, which ought not to be passed over, which is that remarkable difference of pulse which exists between severe inflammation of a serous or of a mucous tissue; or in the former it is small and extremely rapid, while in the latter it is perhaps natural, or but little accelerated.

When the constitutional affection is general and produces fever, the fever may precede the local inflammation, or it may occur at some subsequent period. In the former case it will ultimately be found in all probability that the cause of the fever is a morbid poison, and if so, the latter instances will form the only true cases of sympathetic or symptomatic fever. Assuming then the symptomatic fever to follow the inflammation, it may occur at two different periods, or shortly after the attack of inflammation, or immediately before suppuration takes place.

Symptomatic fever has a distinct connexion with the local disease, for that being healed it immediately subsides. It does not, however, necessarily mark any peculiar form or degree of inflammation, for the fever which ushers in an erythematous eruption is often as considerable, or even more so, as that which accompanies a fatal pneumonia or hepatitis. The same form of inflammation, even in similar membranes, is attended with very different degrees of fever. Thus serous inflammation of the pleura, or of the peritoneum, is seldom accompanied by much fever, while sero-arachnitis is very constantly so. Again, adhesive inflammation of a serous membrane, as the pleura, is often accompanied by some fever; but lymph poured out from the mucous membrane of the larynx, as in croup, or of the colon, as in some forms of diarrhœa, is seldom accompanied by fever.

When inflammation is established and proceeds to suppuration, a severe paroxysm of shivering is often the first indication of the formation of the abscess, or of the effusion of pus, but the degree of symptomatic fever varies greatly even in this case, for a most copious secretion of pus may take place from a mucous membrane, as that of the bronchi or urethra, and the constitution hardly suffers from any appreciable degree of fever, while a trifling amount of pus from a serous membrane is often followed by fever of a fatal character.

In any case the character of the fever depends on the constitution of the patient, for if that be good the fever is attended with a white tongue, much heat, a full and strong pulse, and with little tendency to a brown tongue.

On the contrary, if the patient's constitution be broken, the fever is of a low type. In the event of an abscess forming, the fever is often sthenic during the earlier periods of the inflammation; but as soon as the abscess ripens, if any important organ is its seat, the fever becomes asthenic, with a brown tongue and a rapid pulse, while the local pain in a great measure subsides. At this period the abscess must open either spontaneously or by art, or otherwise the patient for the most part dies. The opening of the abscess, though attended with much pain from the contracting of the inflamed walls, is usually followed by great relief of all the constitutional symptoms, and the pulse rises, the tongue cleans, the appetite returns, and a visible and immediate amendment takes place. If however the patient has been exhausted by his sufferings in the earlier stages of the disease, the relief afforded is but transient, the pus secreted degenerates into a sanies, or is altogether suppressed, the fever changes to typhoid, and the patient sinks, too enfeebled to establish the reparatory process.

It is remarkable, however, that a patient who would be destroyed by a continuance of the suppurative inflammation is often preserved by substituting a process of adhesive inflammation, or of union by the first intention, for that by granulation, or by the second intention, showing that the part is often in one state while the constitution is in another. It is upon this principle the surgeon acts in amputating after a severe compound fracture, or for intractable suppurating diseases of the joints, the constitution having the power to heal a simple wound, though not a suppurating one.

Another law of inflammation is, that for the most part an interval more or less long elapses after the application of the cause before the occurrence of either local or constitutional phenomena. A patient, for instance, receives a violent concussion of the brain; in a short time he recovers himself, and is able to walk home; but a few days after he is seized with arachnitis, or other local inflammation. A person, after being exposed to cold or wet, seldom suffers an immediate attack of inflammation, but the next day, or two or three days after, inflammation of some organ or viscus is established, and the lapse of a similar interval takes place after the application of any other cause.

When the constitutional affection or fever assumes an intermittent type it is termed "*Hectic.*" The paroxysm of hectic usually comprises three stages, or a cold stage, a hot stage, and a sweating stage, but in many cases one or even two of these may be wanting. The cold stage, for example, may be followed by the sweating stage, and this is the cold clammy hectic which patients so much dread; or it may be composed of a hot stage, followed by a sweating stage, which so constantly takes place in the morning in phthisical patients; or the paroxysm may consist of a hot and cold stage, or of a hot, or a cold, or a sweating stage only.

Hectic fever is usually supposed to designate a chronic abscess, and especially an abscess of the lungs; still, it often accompanies chronic disease of the liver, or spleen, in which no suppuration is present. Mr. Hunter has laid it down as a law in surgery, that the further a diseased part is from the source of circulation, the earlier this constitutional affection is formed; or that it occurs sooner when the ankle or wrist joint is affected, than when the hip or shoulder joint is the seat of a similar disease.

General rules of treatment in simple Inflammation.—The great remedies we possess in subduing simple inflammation are bleeding, certain medicines, and topical remedies. The medical treatment of inflamed parts varies greatly according to the organ or tissue affected, and will be best treated of under each respective head of inflammation, but it may be proper to say a few words about bleeding.

Bleeding, by diminishing the quantity and altering the quality of the blood, has a direct tendency to reduce the excitability of the nervous system, and thus to abate the action of the heart and arteries; and if inflammation were merely an increased action of parts, we should only have to apportion the quantity of blood drawn to the increased force or power to cure the disease. Nevertheless, we find in practice that this most powerful of therapeutic agents in the cure of inflammation often requires the greatest caution in its employment; for there is a line beyond which bleeding becomes destructive instead of remedial; and consequently it seems to follow, that in a great number of cases inflammation is something more than increased action. Some general rules are therefore necessary to guide us in the use of the lancet; and none perhaps are of more importance than that its utility varies according to the nature of the cause, the organ affected, and the state of the blood.

There is no truth, perhaps, in medicine more conclusively determined than that we ought not to bleed, or to bleed sparingly, when the inflammation depends on a morbid poison. In epidemics, therefore, of every kind we should not hastily have recourse to the lancet, but should remember the disease probably depends on a poison, has a course to run, and is not amenable to the mere abstraction of blood. Again, the nature of the membrane or organ affected must always be considered in estimating the propriety of bleeding. If a serous membrane, for instance, be acutely inflamed, the patient, for the most part, bears bleeding well, and is usually greatly relieved by it. Inflammation of mucous membranes, however, though occasionally relieved by bleeding, is seldom cured or even greatly influenced by that operation. Another law also which experience has determined is that, as a general principle, diseases of the skin bear bleeding badly, and even when most acute, the patient often sinks if a large quantity of blood be taken. With respect to organs, likewise, it is found that inflammation of the brain is less influenced by bleeding than inflammation of the liver, and inflammation of the liver than inflammation of the lungs.

The next consideration is, what indications for bleeding are to be drawn from the state of the blood? In the great class of febrile diseases, says Andral, the fibrine never augments, remains often in normal quantity, and is also often diminished. In the phlegmasiæ, on the contrary, there is a constant augmentation of this principle; the fibrine being in excess compared with the red globules, and instead of being 3, as in health, oscillates between 4 and 10. It is this excess of fibrine which gives firmness to the clot, and is the cause of its being buffed and cupped. The immediate effect of bleeding, according to the same high authority, is to reduce the red globules instanter, but not so with the fibrine; for a reduction of fibrine does not take place till after a certain time, bleed as you may. Such is the state of the blood in the phlegmasiæ. There are many reasons, however, for not esteeming the buffed and cupped state of the blood denoting an excess of fibrine as a sufficient warranty for bleeding; for these conditions are often present in erysipelas, phthisis, or the early stages of typhus; and in either case the loss of a moderate quantity of blood might hurry the patient to his tomb. Again, in acute rheumatism the blood is not only buffed and cupped, but contains a maximum quantity of fibrine; yet the best practitioners seldom think it necessary to take blood, considering that mode of treatment as neither affording present relief, nor shortening the course of the disease. The fact, then, of the blood being buffed and cupped does not, in all cases, warrant venesection; indeed it is calculated that three-fourths of the victims of mala praxis perish from deducing the rule of treatment solely from the state of the blood. "Bleed daily as long as you see the blood inflamed," was the direction of a naval surgeon to his assistant. The order was strictly obeyed, and thus, adds this gentleman, "I sent many a brave fellow to a watery grave." It follows, then, that in addition to a given state of the blood, certain symptoms must also be present, as well also as the probability of a certain cause, to induce us to bleed largely in inflammation.

There are many circumstances, therefore, which prevent the blood from being an unerring guide for bleeding in cases of inflammation. Still, the blood does offer certain therapeutic indications either for bleeding or not bleeding when the symptoms would otherwise demand or forbid this operation. The firmness of the coagulum, for example, has been considered, at all times, as a mark of the tonic state of the system, and as a warranty for repeating the bleeding when the part is as yet unrelieved; while, on the contrary, a looseness of texture is a sure sign of great debility, so that unless other circumstances strongly indicate the necessity of bleeding it ought not to be repeated.

The proportion of the serum to the clot, and also its occasionally altered characters, are arguments also for or against bleeding. When the quantity of serum is unusually large, unless the clot be very firm, bleeding ought not to be repeated. Also when the properties of the serum are so altered that it coagulates and forms one mass with the clot, bleeding is constantly prejudicial; and lastly, it has been observed, that when the serum, which has little or no affinity for the red globules in health, readily dissolves them, that this is an unerring sign that further bleeding should be avoided, unless no hope remains of saving the patient by any other means.

It is well known that the sthenic or buffed characters of the blood are often greatly modified by the manner in which the blood is drawn; thus, if an individual be bled in both arms, but the blood allowed to flow with different velocities, or in a full stream from one and slowly from the other, the blood drawn is identically the same, yet a thick buff will be wanting in the latter, and be present in the former. Also, if the apertures be of different sizes, the same differences will result; or the blood from the larger orifice will be buffed, while no such effect is seen in the blood drawn from the smaller one. Again, the form of the vessel which receives the blood, as whether it be flat or conical, and also its temperature, or whether the blood be received into one that is cold or warm, will also affect the phenomena of its coagulation. In this difficulty, Mr. Thackrah has furnished us with a most useful rule to correct the error, or to observe the time of the coagulation of the blood. Everything that tends to debilitate the body, or to exhaust the nervous energy, facilitates the coagulation of the blood; or supposing it takes five minutes for blood to coagulate in health, if the patient faint, it will coagulate in two minutes.

In brutes the force of coagulation increases in proportion as the powers of life are impaired, and often in a striking manner; thus, the last portions of blood that flow from a slaughtered animal, as the ox, coagulate much more rapidly than that which follows the knife. If blood also is taken from a dog when he shows much alarm, it coagulates almost immediately. But the most striking proof is perhaps given by Fontana, who found that although the poison of the viper, when mixed with blood recently drawn, does not affect the time of coagulation, still that this substance injected into the veins of a rabbit caused instant coagulation, followed by the death of the animal. It seems, therefore, proved that the time of coagulation is diminished in proportion to the debility of the animal.

OF ACHROMATOUS INFLAMMATIONS.

Achromatous inflammations, or those in which we find the effects of inflammation or its products without any trace of redness, form a class of diseases which, though numerous, has hitherto been little studied. They have no stage or form corresponding to diffuse inflammation, but consist of serous inflammation, which, when it affects organs, as the brain, has been termed Malaxoma, and is the ramollissement of the French, of adhesive inflammation, including hardening of parts or Scleroma, and also the purulent ulcerative and gangrenous inflammations, and these may be either acute or chronic.

Serous achromatous inflammation is very constantly met with in the abdomen, the peritoneum being of a silvery whiteness, opaque, and greatly thickened—effects evidently the result of inflammation; its cavity also is at the same time filled with turbid serum, sometimes containing portions of fibrine. The more remarkable form, however, of achromatous serous inflammation is when it attacks the substance of an organ or tissue, oftentimes rendering it whiter and softer than natural; and in some cases, so loaded with serum as to be almost diffluent, and hence termed malaxoma or ramollissement. Thus, in fever, or after a severe blow on the head, the brain, or some portion of it, is often unnaturally white and exceedingly soft; a state of parts unquestionably the result of inflammation, for the symptoms most commonly are extremely violent, while the membranes are found in every state of inflammation, and adherent generally to the diseased portion of the brain. The same achromatous state of inflammation is frequently met with in a more chronic form; and in many instances the brain is so soft that serum can be expressed from it in considerable quantities. Ramollissement equally attacks the spinal cord, the tissues of the alimentary canal, the heart, the muscles, liver, spleen, and indeed all the organs and tissues of the body.

Achromatous adhesive inflammation is marked by the directly opposite phenomena of malaxoma, or of induration or *scleroma*. Thus the brain or chord is occasionally found as hard as blanche mange, or the white of egg boiled hard; a morbid condition which seems hardly explicable on any other ground than the assumption of a colourless inflammation, for not a trace of a red vessel is to be seen. We also often find the tubuli of the kidney almost cartilaginous, and yet not the slightest injection. It is probably owing to this mode of disease, that adhesions and false membranes are so often formed in the chest and abdomen, not only without the slightest consciousness of disease on the part of the patient during life, but without any appearance of a red vessel after death. If this law be admitted, we must attribute to it the many enlarged and hard spleens, livers, and kidneys. Many old chronic cases of gout or rheumatism of the joints are probably of this character, as well as syphilitic nodes of the bones.

Achromatous suppurative inflammation is often met with on the backs of soldiers on a march, the weight of the knapsack causing abscesses to form at the points of greatest pressure, but these abscesses often form without pain, heat, or redness. We also sometimes find a large abscess in a pale liver, and not a red vessel to be seen. In the lungs also grey hepatization and abscesses around tubercular matter are constantly seen, and yet no sign of increased redness or vascularity. In the brain also abscesses of a similar white formation are sometimes met with. In mucous membranes similar achromatous inflammations are very common: pus is often secreted from the bronchial membrane, the colour of the membrane being natural; and who has yet been able to decide whether a woman does or not in many cases labour under gonorrhœa—the parts in this disease seldom presenting any alteration of colour? The same absence of redness is also occasionally seen of the pericardium or peritonium, those cavities being full of pus.

Achromatous ulcerative inflammation is seen in many instances. No more strenuous battle has been fought by anatomists than whether cartilage is or is not endowed with organic life. Since, however, we observe cartilage swollen and softened, indurated and thinned, and often extensively ulcerated, no doubt can exist of its vitality; yet to the naked eye, in all these diseases, there is not a red vessel visible. In phthisis we often find the plaques de Peyer ulcerated, and yet the membrane is paler than natural; bones and cartilages are often destroyed by ulceration, the parts being so pale that Mr. Hunter has termed it interstitial absorption.

Even some forms of mortification are achromatous, as the mortification in frost-bitten parts, and to which we have before referred; but taking all these forms of achromatous inflammation together, the best and most striking examples are to be found in the proper coats of the arteries, which are often thickened and thinned, softened, indurated, and ulcerated, with an entire achromatous state of the parts. It is probably owing of the existence of some of the preceding forms of disease that we owe the formation of cysts, and of the states of hypertrophy and of atrophy.

Cysts are occasionally formed in all parts of the body, as in the brain, the lungs, liver, spleen, or kidneys. They are also common among the bursæ, on a mucous follicle, a Graafian vesicle, and the cells of the parenchymatous tissue generally. The formation of these cysts depends probably first on an achromatous serous inflammation, followed by an altered balance of secretion and absorption. The cyst once formed, the globule of serum, instead of being absorbed, is multiplied, thus making a pressure which enlarges the cyst, whose walls become thickened by a continued achromatous adhesive inflammation. These cysts are of various sizes; and in the interior of the mouth, or along the edge of the tarsi, they are seldom larger than a pea; in the brain they are sometimes met with as large as a pigeon's egg; while in the ovarium, where they attain their largest magnitude, they often contain two, three, or more gallons. When small, the cyst is generally single; but when of great size, it is more commonly, especially in the ovary, multilocular, the tumor being composed of five or six, or more different cysts. These cysts are liable to inflame and become cancerous, and the seat of tubercular formations.

The external membrane of these cysts is very various, often transparent, thin, and delicate; but in other cases opaque, dense, of considerable thickness, occasionally cartilaginous, and in rarer instances ossified. Their contents are even more diversified than their structure, being generally serum, with little foreign matter; but at other times mixed with large portions of albumen, either in solution, thrown down in flakes, or otherwise precipitated. At other times the contents resemble honey and water, while, if they inflame, we often find lymph, gelatiniform matters, pus, and sometimes a dark fluid, like chocolate or coffee grounds, evidently discoloured by a morbid state of the colouring particles of the blood. The contents of these tumors are sometimes still more remarkable, for when situated in the scalp they sometimes burst, and a secretion in a semi-fluid state exudes and concretes into a dense substance, having the appearance of a horn curved and tortuous, and much resembling those of the inferior animals. These horns, termed plica Polonica, have measured nine inches in length, and from two to three in circumference, and may be removed with the knife with impunity.

The most singular of all the varieties of these tumors is that which, instead of containing the matters which have been mentioned, sometimes contains teeth or hair. Thus Mr. Barnes found in a double encysted tumor of the orbit both teeth and hair. Lobstein gives the case of a man, aged 50, in whom in the course of three months a cyst formed, which, being opened, contained three teeth, each in a separate cyst. In another case, in a cyst connected with the abdominal diaphragm, fat, hair, and four teeth were found. Rysch found four teeth in a tumor of the stomach. These instances might be largely multiplied, and their most frequent seat is the ovary, of which an instance occurred in St. Thomas's Hospital only a few days ago. The encysted teeth are formed according to the same laws as ordinary teeth. They arise from isolated capsules filled with a gelatinous fluid, and if by chance the osseous portion is wanting, the gelatinous is present. Like ordinary teeth, the crown is formed before the root. When there is more teeth than one, their growth is not always simultaneous, for some are yet germs; others milk teeth, while others are the perfect second teeth, and in some cases the milk teeth are found to have been replaced by second teeth. Molar teeth are more frequently met with than incisors; but in all instances the teeth found are similar to those of the animal generating them.

The hair also found growing in these cysts varies in length from two or three inches to twenty or thirty; has always a bulb and root similar to hair of ordinary growth, and may be black, red, brown, or grey, and two or more of these colours have been found in the same cyst. These cysts are said to be lined with cuticle, which may desquamate, and they generally contain some atheromatous matters. Hair has also sometimes been found growing from the surface of membranes, as from under the tongue; from the mucous membrane of the gall-bladder, or bladder, and from the testicle.

Besides the serous cysts which have been mentioned, there is a class of vesicles or serous cysts, which are supposed to have an independent life, and are termed hydatids. There are several genera of this kind found in animals, but two only appear to be peculiar to man, or the cysti-cercus and the acephalo-cystis. The cysticercus has a head somewhat resembling that of a tænia, and a nearly cylindrical body, terminated by a caudal vesicle, and generally exists singly. Dr. Sharpey states he has repeatedly met with them while dissecting at Berlin. The acephalo-cystis, however, is that which is most frequently met with in man, and these have neither head, neck, or visible extremity.

The coat of the acephalo-cystis is a serous membrane of great tenuity and delicacy, so as to be almost transparent, and only, in a few instances, is it opaque or dense. It contains an aqueous fluid nearly pure, and in size varies from less than a pea to a goose's egg. The acephalo-cystis, when it acquires even a very moderate size, often contains a number of smaller hydatids, and these again may contain others of less magnitude than themselves, like a child's nest of boxes. Taking them collectively, they often exist in large numbers; the abdomen in some cases of ascitic dropsy containing many hundreds or thousands. Of the generation of these parasitical animals we know nothing, neither are they supposed to be of long life, for in the pig, if generated in the spring, they appear to die in the autumn, while in man it is doubtful if they live a twelvemonth. The vitality of these cysts, however, is very obscure, its only proof being that they are said to have contracted when thrown into hot water, but even this indication is often wanting.

These animals affect every part of the body, as the brain, spinal cord, the substance of the lungs, the cavity of the chest, the liver, spleen, pancreas, and kidney; the cavity of the abdomen, the tonsils, the uterus, the bladder, the muscles; while sometimes they are embedded in the substance of the bones.

Such are some of the forms and modes of *achromatous* inflammation, which, taking them altogether, form a most extensive class of disease, and contribute in a large proportion to the general mortality. If we look to their causes we shall find in them every error of diet, and all those unhealthful circumstances which congregate about men living in towns and cities. They are for the most part secret in their course, form without pain, and are only denoted at first by occasional disordered action of the part, which increases in frequency till at length the associated viscera and then the constitution take the alarm. The constitutional symptoms are not so uniform nor so marked as in chromatous inflammations; but still they have in many instances a general resemblance to each other, and are greatly more fatal. Has the patient a diseased valve of his heart, he for the most part dies of dropsy; has he an enlarged and otherwise diseased liver, he becomes dyspeptic, perhaps jaundiced and dropsical; has he a diseased spleen, he suffers from dropsy, and generally dies of hæmorrhage. It is in this class of disease that our remedies are so inefficient, and the practitioner will deserve great honour who shall be fortunate enough to discover medicines which may diminish their fatality.

Of Hypertrophy and of Atrophy.

Hypertrophy and Atrophy are among the most frequent phenomena in pathology. Hypertrophy is an abnormal enlargement of the organ or muscle without any apparent change in its healthy structure. Considered pathologically, however, the functions of a healthy organ so enlarged are seldom healthily performed, for an abnormal increase of the powers of the heart uniformly destroys the natural balance of the circulating forces, and ultimately leads to the death of the suffering party. Again, an enlarged liver, even when most healthy in appearance, is for the most part followed by jaundice and dropsy; while a patient labouring under a hypertrophied heart generally suffers from palpitation and asthma, and ultimately falls perhaps from apoplexy or dropsy. It is certain, also, that most hypertrophied organs are for the most part abnormal as to form, the hypertrophied liver being generally enlarged only at its left or at its right lobe. The hypertrophied heart is also generally misshapen, pouchy, the strength of the walls of its different cavities disproportioned to each other, while the capacity of its chambers are of different and of abnormal content. In some instances, as in double organs, the law of hypertrophy is reparatory. Thus if one kidney be atrophied the other usually becomes hypertrophied, and its power of secretion proportionally increased; yet this organ is more likely to become deranged than when the usual provision of nature for the performance of the urinary function is perfect. In like manner, we see the muscles of the leg by exercise acquire a power which may rupture the tendon Achillis, or even snap the bones of the leg asunder. Every organ, even the brain itself, is liable to become hypertrophied, and so is every tissue. More commonly the hypertrophy of tissues is partial, as warty growths from the skin, exostosis from the bones, polypi from mucous membranes, and more particularly a morbid deposition of fat in the adipose tissues. We will now point out some of the more remarkable circumstances connected with the two latter forms of disease.

Polypus is a common species of tumor usually attached to a mucous surface. The simple mucous polypus has a shining appearance, being invested by an extremely delicate membrane resembling a mucous membrane, and moistened apparently by a mucous secretion. It is of a soft consistency, homogeneous in structure, and generally of a semi-transparent light brown colour. In shape it is pyriform or clustered, one or more being suspended from a narrow pedicle or stalk. It seldom attains a large size, possessing but little vascularity, and is nearly devoid of sensibility. The seat of polypi is more especially the nose, uterus, bladder, larynx, œsophagus, stomach, and colon. Fibrous tumors also sometimes spring from the dura mater.

Polypi often become malignant from cancerous deposition, and in this case the disease extends not merely to the mucous membrane, but also to the surrounding parts. Most frequently it is encephaloid in character, and presents a cauliflower appearance, its surface being studded with numerous excrescences of medullary consistency.

Sometimes the adipose tissue is alone hypertrophied, or the seat of *Steatoma.* The person generally in childhood and in advanced age is liable to an embonpoint or increase of fat; but this increase of fat is sometimes a disease, and appears in parts not naturally its seat, and many organs and tissues are consequently capable of undergoing this fatty transformation or *steatoma.*

The muscles are the organs most liable to this transformation, and not merely to a simple accumulation and interposition of fat between the muscular fibres, but these fibres themselves are sometimes converted into steatomatous substance. The muscles of the lower extremities are more disposed to a fatty degenerescence than those of the upper, and we can sometimes trace the progress of this transformation, for by the side of fibres which still preserve their natural appearance, we often see others that are white, and also other fibres which have already experienced the steatomatous conversion. The heart is also occasionally seen to have more or less generally undergone this degenerescence, and, strange to say, is sometimes converted into little more than a soft fatty membrane.

The liver, especially in phthisis, is often found to be loaded with fatty matter, or the seat of steatoma. In this case it is of a pale yellow colour,—preserves the impression of the finger, and, according to Vauquelin, has been found to contain as much as 45 parts of a yellow concrescible oil, greasing the scalpel, and causing paper smeared with it to burn as if dipped in oil.

The kidney is also often liable to this fatty transformation. Dupuytren and Lobstein have both seen the pancreas converted into fat, while Sir Astley Cooper found much fat in the substance of the lungs of his late Majesty George the Fourth, and fat has also been observed in the ovary and testicle.

The membranes are also occasionally the seat of steatomatous tumors; thus Mr. Abernethy found a portion of fat hanging pendulous from the surface of the peritoneum, and several instances are recorded of stearine having been found in the arachnoid. Some short time ago a fatty tumor was observed in a subject examined at St. Thomas's hospital hanging pendent from the mucous membrane of the intestinal canal.

When we observe how extensively the steatomatous conversion prevails, we may infer that under certain conditions of the animal economy it is probable it may take place in all tissues and organs. Its most common seat, however, is the integuments of the body, which may be general, as in the case of Daniel Lambert; or it may be partial, forming a greater or less number of fatty or steatomatous tumors. These are ordinarily pediculated, and have sometimes four or five roots of unequal length; and it is by these pedicles that the vessels are introduced. They are often encysted, and are inconvenient only from their size. The extent to which they may occur may be seen in the following case, taken from the *Revue Médicale*:—The patient was a young woman in good health, but who, although thin and of the middle size, weighed 169 French pounds. Between her shoulders were two adipose, or fatty tumors, 8 inches long and 3 inches broad; a third, of less size, was situated near the arm-pit; and a fourth arose from the inferior angle of the shoulder blade, and was 15 inches long and 6 inches in breadth; a fifth, lower down, was 6 inches long and 5 inches in width; the sixth, which was as large as a man's head, was situated on the right hip; the seventh, which was a small one, was situated below the right trochanter major; and the eighth, which is perhaps the largest on record, arose from the left hypochondrium, and hung down as low as the calf of the leg, being 2 feet long and 3 feet 1 inch in circumference, and weighed, when removed, 46 French pounds. In this country Sir Astley Cooper removed one that weighed 37 lbs. 10 ounces; and Mr. Liston one from the scrotum, which weighed 44½ lbs. The latter gentleman also mentions having removed one the size of an orange from under the tongue.

Sir Benjamin Brodie, so eminently distinguished in every branch of his profession, thus describes the intimate structure of the most common kind of these tumors. The fat resembles ordinary fat, except that it is rather of a more delicate, and of a looser texture, and of a lighter colour. It is composed of lobules with very thin membranes between them, and externally there is a thin membranous bag in which the whole mass is contained. "This bag has a very loose adhesion to the parts in which it is embedded, but the adeps which it encloses adheres pretty firmly to it." These tumors Sir B. Brodie has found to vary in some degree, according to the tissues in which they form, and instances the chronic mammary tumor as a probable variety. These tumors sometimes, though rarely, suppurate, and are seldom malignant in character. (*Med. Gazette.* Feb. 1844.)

Of Atrophy.—Some tissues undergo a spontaneous atrophy, as the umbilical vessels, the thymus gland, the sub-renal capsules, the right lobe of the liver, &c. These have their brief periods of existence and then wither away. In old age the lymphatic ganglia are no longer visible; the ovaries are reduced to a mere capsule; the parenchyma of the lungs is singularly rarified; the bones are of less density, and the brain lighter than in manhood. In disease, however, parts are sometimes greatly atrophied; thus a whole lung may be reduced to the size of the fist, one hemisphere of the brain may be greatly compressed and diminished, a kidney may disappear, the liver or the spleen be greatly reduced in size, and the walls of the heart so attenuated as readily to rupture. All parts of the body, therefore, are liable to be partially or generally atrophied. It is unnecessary to add, that such a loss of power must in all cases produce feebleness of action and disease. It is remarkable, that in health, if one set of muscles be greatly exercised, some other set is usually atrophied. Thus the muscles of the legs of dancers are generally powerfully developed, while those of the arms are soft and attenuated.

Such are the general laws of inflammation and of the non-malignant diseases of structure. It will now be necessary to give their causes, symptoms, and modes of treatment, as they occur in the different tissues and organs of the body, purposely omitting to describe these diseases, when occurring in the eye, or in the bones, as being by convention the more particular province of surgery, and also the diseases of the skin, as unintelligible to the general reader, without the assistance of a large and expensive series of plates.

OF INFLAMMATION OF THE DURA MATER, AND OF OTHER SIMPLE ORGANIC DISEASES OF ITS STRUCTURE.

Remote Causes.—The principal causes which produce inflammation of the dura mater are diseases of the cranial bones, occasioned by mechanical accidents or the syphilitic poison, also the pressure of hydatids, or of a cancerous or other tumor of the brain. Rheumatic inflammation, or an extension of simple inflammation of the internal ear, as in otitis, are other classes of causes. In apoplexy, also, when blood is effused between the bones of the cranium and the dura mater, it is with difficulty absorbed, and becomes sometimes the cause of inflammation of that membrane.

Predisposing Causes.—Inflammation of the dura mater is extremely rare at any period of life; but as this disease results more usually from mechanical injuries or from the syphilitic poison, the earlier periods of adult age are most liable to it.

Pathology.—The dura mater is subject to diffuse inflammation, perhaps to the serous, for water has once been found between this membrane and the cranium; and also to the adhesive, to the suppurative, and to the ulcerative inflammations, and these sometimes terminate in gangrene.

In diffuse inflammation of the dura mater the large vessels of this membrane are congested; but they are not so numerous as in most other tissues, and consequently the redness is not so general or so intense. In the acute forms of this inflammation the membrane readily separates from the bone; and, if rubbed between the fingers, the dura mater readily separates from the arachnoid; but in chronic inflammation these parts often adhere with great tenacity. This inflammation may terminate by resolution, or it may proceed, and lymph be effused. The adhesive inflammation is best seen in injuries of the head, when portions of the dura mater are often healed, or even reproduced to a considerable extent by this process.

Suppurative inflammation is still more common, and is a form of disease often seen in disease of the cranial bones. In other cases, also, when blood is effused between the cranium and dura mater, suppurative inflammation often ensues from irritation, caused by the effused fluid. The pus thus formed may make its way either externally or internally. In the former case a puffy tumor forms on the scalp, which, being divided, exposes a portion of the cranial bone, white and dry, and this, in favourable cases, exfoliates, and gives an exit to the pus. In the latter case the dura mater may ulcerate, and the pus be effused into the sac of the arachnoid. It is not uncommon, after severe injuries, for a portion of the dura mater to become gangrened.

Besides the chromatous inflammations which have been mentioned, the dura mater is occasionally the seat of achromatous inflammation. The formation of cartilaginous and bony deposits is an instance of this. These alterations are in general limited to a few points, seldom exceeding the size of a pea; but in other cases opposite layers shoot towards each other, of considerable length and size, converting the whole of the falciform process into bone.

The dura mater is also occasionally the seat of polypous tumors, pulpy to the touch, of a distinct fibrous structure, and which often acquire a considerable size, sometimes as big as a pullet's egg. These tumors are often pediculated, and resemble a mushroom, and by their pressure not only the bones and membranes are absorbed, but the brain may also be disorganized. Their seat is sometimes that portion of the dura mater which covers the petrous or other portion of the temporal bone; but more commonly they form under the superior portions of the cranium, which being absorbed they appear externally. These tumors have sometimes been seen ossified. Rostan mentions another tumor incident to the dura mater, and which he describes as an inextricable net-work of blood-vessels, or a true nævus, having an erectile disposition.

Symptoms.—The symptoms of acute inflammation of the dura mater are fever, pain in the head, great restlessness, and delirium. In some cases the other membranes of the brain become involved, and effusion takes place, causing coma or paralysis.

If the inflammation succeeds extravasation of blood, the symptoms are, first, those of compression, which partially or wholly disappear. Some time elapses before matter is formed, when fever and delirium succeed. If the patient recovers, the bones exfoliate, and the matter escapes. If, however, he falls, the fatal catastrophe is again preceded by coma, and symptoms generally of compression.

Ossification of the dura mater is sometimes unattended by any symptom. In Dr. Pemberton's case, however, it caused the severest form of tic-douloureux of the face. It has also given rise to epilepsy and to insanity. A case of this latter description occurred in a man who had been many times insane, and at last died of an abscess of the brain. On examination the falciform process of the dura mater was found ossified almost throughout its whole extent, while the arachnoid was as dense as the dura mater.

It is singular, says Rostan, that polypi, as long as they are contained within the cranium, seldom give rise to any symptom; and Louis, out of twenty cases that he quotes in his Memoir on this subject, says, that in two or three cases only was there any lesion of muscular motion, of the senses, or of the intellect. These tumors consequently can hardly be determined to exist until they make their way through the walls of the cranium. They are of variable size, and pulsate synchronously with the heart. This action may be stopped by compression, made either laterally or perpendicularly; but in the latter case the usual phenomena of cerebral compression, as loss of sense, convulsions, coma, or palsy, are brought on, but which disappear as soon as the finger is removed. In some instances the bone is rendered so thin by the process of absorption that, just prior to the eruption of the tumor, it gives a sound, when pressed upon, like the cracking of parchment.

Diagnosis.—When the cerebral symptoms are preceded by rheumatism, or are the result of the syphilitic poison, we may, without hesitation, affirm the seat of the disease to be the dura mater. When they arise from other causes, the other membranes are in general involved in the disease, and the symptoms are too complicated to allow of an accurate diagnosis.

Prognosis.—The prognosis in cases of syphilitic or of rheumatic affections of the dura mater is always favourable, however formidable the symptoms may appear. When the inflammation arises from mechanical causes, the brain having sustained an injury, the prognosis is in general less favourable.

Treatment.—The treatment of acute rheumatic inflammation, before effusion has taken place, is by bleeding and by mercury, so as to affect the mouth; and in cases of syphilis, by the iodide of potash. If matter forms, and the bone does not exfoliate, nothing but the happy temerity of the surgeon in trephining can in general save the patient.

The osseous depositions of the dura mater, unless capable of being removed by mercury or iodine, are at present beyond the powers of medicine. The treatment of the polypous formations is entirely surgical.

OF ARACHNITIS.

Remote Cause.—Arachnitis is a disease which most commonly occurs from the action of a morbid poison; and indeed there are few agents of that class which do not act on the membranes of the brain. There are many instances, also, of persons suffering from arachnitis after exposure to the heat of the summer's sun, or to the "*coup de soleil.*" Intemperance, as well as great mental anxiety, is also a frequent cause of the chronic forms of the disease. Arachnitis is also especially connected with insanity, and with every structural disease of the brain; and to these causes must be added mechanical injuries.

Predisposing Causes.—Every age is liable to arachnitis. Children are often attacked by it whilst teething, under the form of hydrocephalus acutus, and also when labouring under scarlatina, measles, or other disease caused by a morbid poison. Adult age, as well as the middle periods of life, are still more liable to this affection, both from the greater exposure to the action of the typhoid and paludal poisons, to mechanical injuries, as well as to the greater intemperance and greater excitement incident to this age. In old people arachnitis is likewise common, more particularly from the ramollissement and other organic lesions of the brain, to which they are subjected. Both sexes perhaps suffer in nearly equal proportions from this affection.

Pathology.—The serous membranes of the brain are liable, with little exception, to all the forms of inflammation incident to serous membranes generally,—or to the diffuse, the serous, the adhesive, the suppurative, and the ulcerative; and these inflammations may be either acute or chronic.

In diffuse arachnitis the arachnoid has seldom any considerable redness or congestion, but is thickened and opaque; while the transparent serum naturally contained in the cavity of the arachnoid being now scanty, or wholly wanting, it has neither that polish nor that moisture which is natural to it in health, so that it appears brown and dry. The principal phenomena of arachnitis take place in the pia mater, so that the large vessels of that membrane are greatly congested; but still, according to Dr. Baillie, the redness is not so general or so continuous as in inflammation of other serous membranes. Also, if the pia mater be attempted to be removed, it is easily torn, and separates from the brain in small fragments. The arachnoid covering the dura mater seldom participates in this affection. These are the appearances observed in diffuse arachnitis, supposing it to terminate by resolution. The inflammation, however, often proceeds, and may now terminate by effusion of serum, lymph, or pus.

When serum is effused into the arachnoid cavity, the opacity of the arachnoid gives it a gelatiniform appearance; but when that membrane is divided it is found to be fluid, and to diffuse itself in every direction. Sometimes, however, the serum is found to be turbid, from an admixture of a small portion of free albumen. It is also not unusual to find a few points of lymph, of pus, or of blood, either at the exterior surface or in the cells of the arachnoid, effused along with the serum, and almost in juxtaposition with each other; so that every form of inflammation may co-exist at the same time in this membrane. The quantity of fluid effused is very variable, or from two to three drachms to as many ounces. The effusion most commonly takes place at the upper surface of the hemisphere, but sometimes at the base, and sometimes into the ventricles of the brain.

It is seldom that the inflammation is of greater intensity than has been mentioned, but occasionally it is so; and lymph is effused either into the *cavity* of the arachnoid, or into the arachnoid *sac*. Gendrin gives a case of a woman, aged 30, who, suddenly hearing of the death of her lover, lost her speech and her reason. After some months she so far recovered as to be sensible of her loss; but, although she shed no tears, she could speak of nothing else than their mutual affection. At length she relapsed and died; and, on opening the *sac*, it was impossible to distinguish the arachnoid, it being covered with a gelatiniform mass of loose lymph. Foville (*Art. Meningite*, p. 406, *Dict. de Médecine*, *&c.*) says he has met with six cases of this description, the effused lymph covering the whole of the brain, or nearly so, as far as the tentorium. The lymph was deposited in the arachnoid sac in two layers,—one adherent to the cranial arachnoid, and the other to the cerebral arachnoid; while between them was a stratum of serum, except in one case, where blood was effused. Foville mentions having had all these persons under his care for several years, and that they were all in a state of the dullest stupidity, and apparently labouring under paralysis of every sense. They were like statues, with this difference, that, placed upright, they preserved their balance; if pushed, they walked; and if food was placed in their mouths, they swallowed it.

When lymph is effused between the cranial and cerebral arachnoid, it is sometimes organized. Thus Rostan speaks of having found, in one of these cases, the cranial and cerebral arachnoids so thoroughly adherent as to form one mass, and Gendrin gives a similar instance of a woman of 70, who died comatose after a few days' illness.

Lymph also may be effused into the arachnoid cavity, but it is generally in small quantity, and is so seldom organized, that Louis states that he examined the brains of 200 bodies without finding a single instance. Rostan, however, is of opinion that in chronic inflammation of the cerebral arachnoid, the thickening is occasioned by the superposition of an organized false membrane, which, being detached, the original membrane recovers its primitive delicacy of texture, and almost its primitive transparency.

Suppurative inflammation may take place either into the arachnoid cavity or into the arachnoid sac. Rostan gives several cases of effusion of pus into the arachnoid cavity, and so does Morgagni, Cruveilhier, and Dr. Bright. Dr. Baillie states, he once saw pus effused into the cavity to such an amount as to cover the entire upper surface of the brain. Two cases are also given by Dr. Hodgkin of cut wounds of the head in which pus was found in the arachnoid sac.

The characters of chronic arachnitis are—a similar opacity and thickening of the membranes, together with granulations of a pearl colour, and more especially along the longitudinal sinus, and also an augmentation of the number of the glandulæ Pacchioni. Much serum is also effused into the cavity; and the cellular tissue by which the pia mater is attached to the brain acquires considerable strength, so that portions of the brain come away with the membranes. The surface of the brain is pale, and sometimes slightly atrophied. Ossification of the pia mater is extremely rare. Dr. Baillie, however, mentions one case, on the authority of Soëmmering; and Dr. Hodgkin speaks of a specimen in the museum of Guy's Hospital.

In acute arachnitis of the ventricles, the membrane becomes thickened, semi-transparent, pulpy, and sometimes sprinkled with minute spots of blood. It is rare to find lymph effused, but occasionally old adhesions are seen between the opposite surfaces of the ventricle. Pus has also been occasionally found in the ventricles, either as a primary disease, or else in consequence of suppuration into the cavity of the spinal arachnoid. The surface of the ventricles also has occasionally been found sprinkled with points of scabrous matter, like particles of pounded glass, or rather resembling the gritty matter found in the pineal gland.

From the abundance and size of the vessels of the plexus choröides, it might be supposed that this part would be greatly liable to inflammation; but its diseases are chiefly chronic and achromatous, as small cysts, which sometimes give to the plexus the appearance of a bunch of currants; they have also been seen as big as a gooseberry, and even as a pullet's egg. The plexus is also liable to the formation of white opaque points, which may attain the size of a barberry. These are sometimes soft, and sometimes of a firm consistency, and are liable to become loaded with earthy matter.

Symptoms.—Arachnitis is usually divided into three stages. The symptoms of the first stage are those of excitement, resulting from diffuse inflammation; those of the second are those of compression, marking that effusion has taken place; while those of the third stage denote recovery or death.

The first stage is ushered in by fever, at first remittent, but which at length becomes continued; the patient complains of headache, of light and sound being painful, while the conjunctiva is red and injected; yet with this increased sensibility he is torpid and unwilling to be roused. At the end of a short period he rambles or becomes delirious, and in some cases violently so: at length effusion takes place, and the second stage commences with symptoms of compression of the brain; the eye and ear are no longer painful; the delirium, from being active, has changed to low and muttering; the pupil dilated, and the supply of nervous fluid so irregular, that the muscles are affected with subsultus tendinum. The sphincters of the bladder are often contracted or relaxed, so that the urine flows incessantly, or else is retained altogether. The sphincters of the rectum are also often relaxed, and the stools come away without the patient's consciousness. The last stage is that in which these symptoms gradually subside, and the patient recovers, or else be becomes comatose, and dies in a typhoid state.

The duration of these stages is very various. Sometimes each lasts a week; and this, perhaps, is most commonly the case, but one or more stages may be wanting.

The tongue, in the first stage, is white; in the second, it becomes brown; in the third, it again cleans, or the patient dies. The pulse likewise in the first stage is from 90 to 100; in the second, from 110 to 130; and in the last stage it either gradually returns to its natural standard, or else runs on too rapid and too feeble to be counted.

The symptoms which have been described are those which mark arachnitis at the superior portions of the brain. When, however, it occurs at the base, or in the ventricles, some differences are observable; for the intellect is less impaired, but the passions more excited, and the patient lies fretful, impatient, morose, and, although somnolescent, he occasionally cries out, grinds his teeth, while the parallelism of the axis of the eyes is frequently affected.

Such is the more usual course of arachnitis, but Dr. Watson has given two cases of arachnitis in children, one 9 years, and the other 2 years old, in which a yellow adventitious membrane was spread out between the arachnoid and pia mater. In the first of these cases the attack came on suddenly in the middle of the night, the girl screaming from violent headache, and exclaiming somebody had given her a blow on the head. The other was equally suddenly attacked one morning with long and severe convulsions. They both appeared to have died comatose, the one on the sixth day, and the other on the fourth.

Chronic meningitis may exist *per se*, or may succeed to the acute form, and the symptoms of this affection are very various. One patient had no other symptom for some months than headache and paraplegia of the upper extremities, when he fell into a typhoid state and died. Often insanity is the first symptom; and this is followed first by the speech becoming affected, and then by hemiplegia, and this perhaps by apoplexy. The duration of this affection is from a few weeks to many months. The cases recorded by Foville of the statue-like character of the patients, when effusion of lymph has taken place into the arachnoid sac, are too few in number to allow us to consider the connexion between those symptoms and that peculiar form of disease as established; but should they ultimately prove so, it will be a curious problem to determine the probable cause of so complete an annihilation of the intellect.

Diagnosis.—Arachnitis is distinguished from encephalitis by the headache, the early delirium, and by the general absence of hemiplegia. It must be admitted, however, that disease of the brain, and of its membranes, is often conjoined, so that arachnitis is not in all cases a simple affection.

Prognosis.—Six cases of arachnitis out of seven are supposed to recover in fever. When it depends on mechanical injuries, the prognosis is more unfavourable; and should it become chronic, the ultimate result is often fatal.

Treatment.—The treatment of arachnitis, when arising from morbid poisons, will be mentioned under the head of the diseases caused by those agents. As a general principle, however, remedies have little influence over those forms of the disease. When arachnitis arises from mechanical injuries, the treatment is by bleeding, calomel, active purgatives, and by cold applications to the head. In chronic cases of insanity, Foville strongly recommends the cold *douche*, but with caution, as being a powerful depressant, yet producing less ultimate debility than bleeding. He seems to think it acts by cooling down the general mass of the blood, and producing a salutary general re-action. He quotes the experiment of Harvey, who, having passed a ligature round his arm, so as to stop the circulation, put the lower part of the limb into cold water; when that was sensibly cooled down, he removed the ligature, and speaks of having felt the cold blood flowing along the arm, &c., till it reached the heart, and gave the sensation of coldness in that organ.

The dietetic treatment should be strictly antiphlogistical, and the patient should likewise avoid all mental excitement; and indeed, if not secluded, should be kept tranquil not only in body but also in mind.

OF ENCEPHALITIS, OR INFLAMMATION OF THE SUBSTANCE OF THE BRAIN, AND OF OTHER SIMPLE ORGANIC DISEASES OF ITS STRUCTURE.

Inflammation of the brain was a disease little known to the ancients, and even much still remains to be done in elucidation of this important subject. The writers who have most contributed to remove the difficulties connected with this interesting inquiry are Morgagni, Rostan, Lallemand, Bouillaud, and Abercrombie. 2368 cases are reported to have died of cephalitis in England and Wales in 1839.

Remote Cause.—Inflammation of the substance of the brain is caused by every morbid poison that produces fever. Many cases also result from mechanical injuries, others from the excitement of insanity and uncontrolled moral feelings. In some instances encephalitis has followed the suppression of a cutaneous eruption, in others caries of the bones of the cranium, and especially of the petrous portion of the temporal bone caused by otitis. Intemperance also is a frequent cause of this as well as of every other disease of the brain. As a secondary disease, encephalitis is produced by cancer, tubercle, and by every other structural disease incident to this organ.

Predisposing Causes.—Encephalitis occurs at every age: in childhood during the tendency to hydrocephalus; in adult age from the action of morbid poisons, and from mechanical and moral accidents; and in old age from the natural decay of the frame. If we assume ramollissement of the brain to be a form of encephalitis, that disease has occurred at the following ages, or in a few cases from birth to 15; thirty-nine cases occurred from 15 to 40; fifty-four cases from 40 to 65; and sixty cases from 65 to 87. The frequency of this disease, therefore, increases with age. Men are supposed to suffer in a larger proportion than women from this disease, and probably from their greater exposure to the exciting causes.

Pathology.—The inflammations of the substance of the brain have much that is peculiar. In a small number of instances they are chromatous, but in by far the greater number of cases they are *achromatous* or colourless. Taking both classes, the brain may be said to labour under the diffuse, the serous, the adhesive, the suppurative, and the gangrenous inflammations.

The red *diffuse* or chromatous inflammation of the substance of the brain appears to have many degrees. In the first degree the substance of the brain, when cut into, exhibits more bloody points than usual, so that the medullary substance appears as if sprinkled with blood, while the colour of the cortical substance is increased in intensity. If the inflammation assumes a higher degree, it only partially affects the brain, as one of the convolutions, or a small portion of a hemisphere; and the inflamed part now varies from a bright rose to a deep red colour. This increase of colour is supposed by many pathologists not to arise from any greater vascularity of the part, but from blood escaping from the vessels and becoming effused or infiltrated into the substance of the brain, forming, according to Boyer, so many apoplectic *foyers*. The inflamed part is generally swollen, and sometimes considerably so, and is generally softer, though sometimes firmer than usual.

The most common form, however, of inflammation is for the most part achromatous, and is termed *ramollissement* of the brain, and appears to be a variety of serous inflammation modified by peculiarity of texture. The characteristic of the part affected is, that it is generally whiter or greyer than the natural colour of the brain, and also softer than the natural substance of the brain. This softening has many degrees, and in its extreme form the brain is absolutely diffluent, so that it can be poured out of the cranium with as much facility as a thickened cream or a thin jelly can be poured from one cup into another. In this semi-liquid state much serum can often be expressed from it. This disease may be acute or chronic, and the following instances will show that its causes are those which produce inflammation in other parts of the body, and also that its course is similar.

Paroisse (*Opuscules de Chirurgie.* Paris, 1806) states that he examined the brain of twelve persons who died between the nineteenth and twenty-second days, after the loss of a considerable portion of the cranium from sabre wounds. Each wound was as large as the palm of the hand; and a considerable portion of the dura mater, as well as of the brain, had been cut off with the abscinded portion of the cranium. The most remarkable pathological phenomena in these cases was a great diminution in the size of the brain, and its extreme *softness.* There was no water in the ventricles, and the dura mater was dry. The arachnoid was strongly adherent to the brain, and in some instances appeared to have been partly destroyed by suppuration. In some cases there was little or no moisture in the substance of the brain, so that it appeared dried up.

Mr. Stanley gives two cases of hernia cerebri, in one of which, after excision of the protruded portion, " the protruded brain lost its natural colour, and acquired a light yellow appearance, was split into several portions, and often exhaled from it an exceedingly fœtid odour. Its substance daily became *softer*, ultimately acquiring an almost *semi-fluid* state, and in this state the whole mass wasted away. As the dead and putrid brain was detached fresh granulations rose to fill the vacancy, just as we see them arising from any surface from which a dead part has been separated by the natural processes."

In another case in which, after the excision of a portion of the brain, the brain again protruded, and acquired the size of a hen's egg. On examination after death, the protruded portion was in some parts *softened*, and had red particles of blood intermixed with it, while " all the medullary structure intervening between the base of the protruded part and the anterior corner of the lateral ventricle had entirely lost its natural structure, and had become *soft* and *pulpy*, so as to convey the idea of rottenness. Around this disorganized mass, and extending across the corpus callosum into the medullary substance, forming the roof of the opposite ventricle, the brain had undergone a change from its natural colour to a greyish-blue-white, while it still retained its natural consistency. It is remarkable that in this case during the last three days we noticed a very considerable quantity of fluid constantly oozing from the centre of the protrusion, whence it trickled down the cheek in a continued stream." Mr. Stanley conceives this fluid came from the lateral ventricles; although, from the soft and rotten state of the brain, he admits " we were not able to discover any distinct channel of communication between them."

In the cases that have been narrated, the injuries were most severe, and the termination fatal in a few days, so that no doubt can exist of the acute character of the ramollissement; and yet the pathological phenomenon in all was *softening*, without any red discoloration, thus rendering it highly probable, if not strictly demonstrating, that the softening must be the result of an achromatous inflammation. Another proof, also, of the inflammatory nature of ramollissement is afforded by Dr. Carswell, who states he has found the vessels of the part obliterated and indurated, traversing the diseased portion like so many small wires.

The forms of ramollissement may be chronic as well as acute, and these are also achromatous. It is singular how large a portion of the brain may be affected with this chronic disease, as a whole hemisphere, and sometimes the entire mass of the brain. The consistency of the diseased part varies, as in the acute form, from cream to a thin jelly, or probably according to the quantity of serum it contains. It is strange that when most diffluent it is still compatible with many of the functions of the mind.

Dr. Sims (*Med. and Chir. Trans.* vol. xix. p. 413) is of opinion that ramollissement is capable of being cured, and that the evidence of this fact is the disappearance of one or more layers of the cortical substance, as he supposes, by absorption, while the pia mater adheres to this part of the brain. The evidence of the cure of ramollissement in the grey matter of the corpora striata and other central parts, is the presence of a number of "holes," resembling, he says, Parmesan cheese, of a red colour, when there has been transudation from the blood-vessels, and of a fawn-colour in other cases. The part, he says, is also atrophied and softened; while the holes may be filled with a limpid fluid, sometimes lined with a membrane.

The next of the achromatous inflammations of the substance of the brain is that state in which, instead of being softened and diffluent, the brain becomes harder than natural, and acquires the consistency of white of egg boiled hard, or of well made *jaune mange.* M. Dance (*Répertoire Géneral d'Anatomie et de Physiologie*, 1828) gives the case of a patient who received a blow on the head about seven months before his death. He afterwards suffered from epistaxis, and severe and frequent paroxysms of headache. At length he fell down in walking from the bath, and died convulsed in about a quarter of an hour. On inspecting the brain the convolutions were flattened; there was very little blood, and no serous fluid in the encephalon; but all the substance of the brain resembled white of egg boiled hard. Its weight and density were considerable, and it yielded and recovered its form like an elastic body. There was no trace of a red vessel, so that the cortical substance was paler, and the medullary substance whiter, than usual. This may be considered as the result of adhesive inflammation; and that adhesive inflammation is a property of the brain is certain, from the formation of cysts, and of the union of divided parts by cicatrization.

The next form of inflammation is the suppurative; and the suppurative inflammation may be either acute or chronic. Most authors have supposed it may be of two kinds, or that the pus may be collected into an *abscess*, or else be *infiltrated* through the substance of the brain. This inflammation may perhaps be chromatous, but in the far greater number of cases it is achromatous, no trace of redness being seen in any part of the brain.

Abscess of the brain, then, is generally strictly achromatous, the surrounding substance of the brain being of the natural colour, except in a very few cases in which it succeeds to apoplectic effusion, when the walls of the cavities are dyed by the previously extravasated blood. Dr. Baillie says, when the abscess is of large size the weight of the pus breaks down the neighbouring parts, and they look simply as if they had been destroyed, or very much injured by the pressure; and also when the abscesses are small, there is an ulcerated appearance of the cavity in which the pus is contained. In other cases the usual membrane of an abscess forms. This membrane is at first extremely delicate, and easily torn; but as the disease advances it becomes of greater consistency, and even of considerable density, so that in some cases it is fibrous, fibro-cartilaginous, and even ossified, and is thus one of the causes of the formation of bony tumors of the brain. The patient seldom perhaps survives the formation of an abscess; but it is apprehended that the pus may be occasionally absorbed, and that the opposite walls may unite by granulations, and leave a cellular cicatrix. The size of the abscess is very various, being sometimes hardly bigger than a pin's head, and then again as large as a pullet's egg. When large they are seldom more in number than one; but when small there are sometimes several. The pus contained in them is often good laudable pus, but in other cases it is serous, and contains portions of lymph or albumen.

Infiltration of pus or purulent ramollissement is apprehended to exist when the brain is softened, and the diseased part of a yellow or cream colour. That this state of parts is owing to purulent effusion is a fact inferred rather than proved, and consequently this doctrine requires much further investigation before it can be considered as established.

Besides these forms of inflammation, Mr. Stanley has shown that in his cases of hernia of the brain, portions of the brain have *sloughed* away, have *granulated*, and have passed into a state of gangrene; showing that this organ, so singular in its structure, is possessed of every power of inflammation known to exist in other parts.

The pathology of the cerebellum, whether acute or chronic, is in every respect, as far as is at present known, similar to that of the brain.

It is impossible to give the relative frequency of these different forms of inflammation of the substance of the brain; but the red punctuated state of the brain is the most common, then the serous or ramollescent state, while all the other forms are infrequent. If we take ramollescence of the brain as the most striking instance of its disorganization, we find it does not affect all parts of the brain equally, for out of 171 cases there was,—

	Cases.
Ramollissement of the whole of both hemispheres in	4
one hemisphere in its whole extent	13
single convolutions . . .	14
convolutions and deeper-seated parts	9
anterior lobes	27
middles lobes	37
posterior lobes . . .	16
corpora striata . . .	28
thalami opticorum . . .	15
walls of the ventricles . .	2
crus cerebri	1
various parts	5
	171

The two hemispheres of the brain suffer from ramollissement with nearly equal frequency, or out of 169 cases the right hemisphere was affected in seventy-three cases, the left in sixty-three, and both in thirty-three instances.

Ramollissement of the cerebellum is much more rare than of the brain, and Andral states that, up to 1833, only thirteen cases of this affection had been recorded.

In eight of these the disease was limited to one of the lateral lobes. In four, both lobes were affected; and in the last case there was an isolated ramollissement of the median lobe. In four of these cases the brain was concomitantly diseased, in another the mesocephale, and in another the spinal cord.

Encysted or other tumors have sometimes been found in the substance of the brain. Dr. Sims gives a remarkable case of this in a woman aged 48, who had hemiplegia of the left side for three years. In this case more than half of the substance of the right hemisphere was found to be wanting, and its place occupied by fluid contained in a membrane. The substance of the brain forming the walls of the cavity was fawn-coloured, and soft like jelly.* Hydatids are also sometimes found in the substance of the brain, and, according to Cruveilhier, the cysticercus is more common than the acephalocyst. Bony tumors are sometimes met with, and most commonly consist of an irregular mass, formed by bony processes, with a fleshy substance filling up the interstices; and of this sort of tumor, Dr. Baillie says there are several examples in Dr. Hunter's museum.

Otto, in his *Compendium of Pathological Anatomy*, translated by Mr. South, remarks that *hypertrophy* of the brain is especially produced in rickets, and in rare cases may occur even before birth; " that it frequently occurs at birth, when the brain sometimes attains a very large size. I have twice seen this to such an extent," he adds, " that the elasticity of the brain thrust up the calvaria at certain points, by bursting asunder slight sutures." Mr. Sweatman relates the case of premature development of the brain in a child 2 years old, in which this organ weighed 2 lb. 15½ ounces avoirdupois, the average weight being, at this period of life, 2 lb. 1 to 2 ounces. Dr. Sims gives a case of a man whose brain weighed 3 lb. 9 ounces, the average weight being under 3 lb. In a girl 10 years old the brain weighed 3 lb. 12 ounces, the average weight being about 2 lb. 10 or 11 ounces. Otto thinks it may be a mode of cure of hydrocephalus, the ventricles having been expanded by fluid at some former period; while Andral thinks that repeated hyperæmia of the brain may be one cause among others of hypertrophy of the brain.

The brain is sometimes found *atrophied.* In a woman that died apoplectic, the brain weighed only 2 lb. 4 ounces, being 6½ ounces less than the average weight of the brain at that age. The brain of a child two years old, that died of pneumonia, was weighed the same day, and was 2 lb. 3 ounces. Atrophy of the brain is for the most part a congenital disease; but it also appears to be a disease incident to old age; for the weight of the brain at 50 averages 2 lb. $14\frac{20}{29}$ ounces, while at 70 and upwards it only averages 2 lb. $4\frac{3}{44}$ ounces.

The great physiological question connected with this portion of the subject is, whether the different parts of the brain, which have been observed to be the seat of the different lesions which have been mentioned, have demonstrated the phrenology of the present day, and shown the seats of the different faculties, either of mind or of motion. Andral has compared the different seats of lesion affected with ramollissement, but has found no constant connexion between the part affected and the mental disorder; and he thinks that the existence or absence of the disordered functions of the mind in cases of ramollissement depends much less on the seat of the alteration than on the sympathetic affection which exists between the softened part and the rest of the encephalon.

Symptoms.—Diffuse inflammation of the substance of the brain arises very generally, if not constantly, as a consequence or as a concomitant of arachnitis; and the symptoms are consequently identical,—as fever, headache, the senses pained by their natural stimulants, delirium, subsultus, coma, resolution of the sphincters, and death.

The symptoms of *Ramollissement* of the brain have probably a considerable latitude. In the twelve cases related by M. Paroisse, and resulting from wounds, he states that the symptoms were nearly the same in all, and were as follows:—The men all stated that after the wound they had felt no other inconvenience than local pain of the injured part, and that for two or three days afterwards they had all been able to march five or six leagues a day. On the third day, however, they had all been seized with fever, which terminated on the evening of the fourth day; but from that period they had suffered little, always preserved a good appetite, and prayed not to be put on a low diet. About the seventeenth day they became downcast and dejected, owing, probably, to many sloughs being detached, and much suppuration taking place about this time. On the following day they first lost the sense of smell, and then the senses of sight and taste. With these symptoms, but without fever or convulsions, they fell into an easy sleep; and, as if they had no further strength to contend with the disorder, they died between the nineteenth and twenty-second days from the infliction of the wound.

The symptoms which have been related by Paroisse agree entirely with those observed by John Hunter. That skilful surgeon observed that trifling wounds of the membranes of the brain were often followed by severe and extensive inflammation of those tissues, and by very dangerous symptoms; but if the injury had been great so as to have excised not only a portion of the arachnoid, but also of the substance of the brain, that the symptoms which followed were comparatively slight—a circumstance which he attributed to the brain in the latter case having room for expansion; and he therefore suggested the propriety of extensively lacerating the arachnoid and pia mater in all cases in which the dura mater alone had been wounded.

Idiopathic ramollissement may be acute or chronic, and its attack may be sudden, or preceded by some preliminary symptoms, as headache, or long-continued derangement of the digestive organs.

In whichever way the disease forms, the severity of its attacks are sometimes as formidable and as overwhelming as a fit of apoplexy. The patient falls down in a similar state of insensibility, and his limbs are similarly palsied. There is often no difference between apoplexy and ramollissement in the fit, but there are striking differences after recovery from the fit. On recovering from apoplexy, for example, the patient has some degree of intelligence; but after a severe attack of ramollissement, the mind is impaired and delirious. A woman, about fifty, had suffered from ill-health, but not by any headache, giddiness, or other cerebral symptom, when on a sudden she was seized as in apoplexy, and on recovering at the end of a few hours was hemiplegic, delirious, and did not know the persons about her. Bleeding and other antiphlogistic treatment appeared rather to aggravate the symptoms; and in a few days she experienced a second attack, after which she lay without speech or motion, and died in a typhoid state. In this case the left ventricle, on being opened, presented the appearance of an ulcerated surface, being very loose in texture, or in a state of ramollissement resembling curds and whey, except in some portions of it, which resembled a rotten apple.

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* *Med. Chir.*, vol. xix.

In some instances the attack commences without the fit, but in almost as sudden a manner. A gentleman, whose health had been so good that he had dined out only a day or two before, found, on getting into bed, that his leg failed him. He rang the bell, but when the family reached the room, his mind was so far gone that he mistook the persons about him. As his head was evidently affected, some leeches were applied to his temples; but while they were drawing, his arm dropped, and in a few hours he fell into a typhoid state, with a brown tongue, so that it was necessary to support him with some glasses of claret daily. He at length recovered, and lived several years, but the hemiplegia remained.

In another case of a gentleman who had long suffered from derangement of the digestive organs, with a white tongue, and also with headache, the first symptom of the brain being structurally affected was, that on attempting to walk he found himself moving in a small circle around his room, and had no ability to walk straightforwards owing to a want of power in his right side. The paralytic symptoms increased, and in a remarkable manner, so that the pupil of one eye was dilated, and the other contracted: one side of the face was exceedingly sensible, while the other had lost all sensation. The right arm was palsied, while the left was numbed, and the left leg was palsied, while the right leg was benumbed. Every attempt to bleed this patient was followed by syncope, and he at last recovered by wine and tonics.

The cases that have been related are, perhaps, fair specimens of the acute attacks of ramollissement of the brain. In the chronic forms of the disease the course is slower, and Rostan divides it into two stages.

The first stage, preceded perhaps by headache, or by derangement of the digestive organs, commences by the patient complaining of vertigo, numbness, of a pricking of the arm or leg, and often of confused vision. In addition to these disordered perceptions, the judgment, the memory, or other faculty of the mind, is more or less affected, and the patient falls into a sort of senile *dementia*. His speech also is often affected, his answers slow and hesitating, and he has great disposition to sleep. In the midst of this overthrow of the functions of the brain, the functions of organic life present no remarkable alteration, except that in some cases the tongue is white, micturition difficult, the pulse slow, and the appetite voracious.

The second stage is marked by decided palsy,—the use of a limb or of one side of the body being lost, sometimes suddenly and sometimes gradually. The speech is also more and more affected, so that the patient with difficulty makes himself understood. His tongue now becomes brown, his pulse rapid, and he lies in a typhoid comatose state, from which he rarely recovers. In some instances contraction of the limb occurs instead of relaxation, the extensors being palsied while the flexors still retain their full powers. Convulsions, also, of one or both sides of the body may take place in the course of the disease.

Palsy, it has been stated, not only affects the muscles, but impairs also the sensations of the limbs. Still in some cases the sensibility of the skin, instead of being lost or deadened, is singularly increased, so that the patient screams out if touched, or subjected to the slightest pressure; and this sensation of extreme pain, though frequently limited to one limb, yet sometimes extends over the whole body. Some patients compare it to the pricking of a thousand needles; others to the sensation of a burn, and which the slightest attempt to bend the limb renders insupportable.

The pulse is so little affected in chronic ramollissement of the brain, that in 97 cases out of 126 taken by Andral, he has not noticed its frequency; but it is occasionally something slower, and occasionally more frequent than in health.

The duration of life in ramollissement of the brain is very various, but in 109 cases the disease terminated in the following times,—

1	died in	12	hours	7	died in	6	days	3	died in	15	days	1	died in	25	days	1	died in	65	days
1	,,	15	,,	8	,,	7	,,	1	,,	16	,,	1	,,	29	,,	1	,,	68	,,
1	,,	24	,,	8	,,	8	,,	2	,,	17	,,	4	,,	30	,,	1	,,	190	,,
1	,,	32	,,	3	,,	9	,,	4	,,	18	,,	1	,,	35	,,	1	,,	220	,,
5	,,	2	days	5	,,	10	,,	5	,,	20	,,	1	,,	36	,,	1	,,	5	months
9	,,	3	,,	4	,,	11	,,	3	,,	21	,,	1	,,	47	,,	2	,,	6	,,
5	,,	4	,,	2	,,	12	,,	1	,,	22	,,	1	,,	49	,,	1	,,	1	year
4	,,	5	,,	3	,,	13	,,	1	,,	23	,,	1	,,	60	,,	2	,,	3	,,

The inference deducible from this table, is, that ramollissement of the brain is more frequently an acute than a chronic disease, the greatest number dying before the 12th day, while at the end of a month only 16 cases out of the 109 were living.

In the 13 cases which have been collected of ramollissement of the *cerebellum*, the lesions of intellect were trifling, while motion was greatly affected in all except one doubtful case, or in 10 there was palsy with or without contraction of the muscles of the opposite side of the body; in two others convulsive actions of both sides of the body, and in the last case which was observed by Rostan, the palsy was on the same side. In this case the disease depended on an exostosis of the petrous portion of the temporal bone. In no instance is any sexual desire recorded to have troubled the patient.

Induration of the brain is of rare occurrence, and its symptoms can hardly be said to be yet determined. In a case related by M. Dance,* the man received a blow on his head about seven months before his death; he afterwards suffered from epistaxis, and severe and frequent paroxysms of the headache. He fell down while walking from the bath, and died convulsed in about a quarter of an hour. Another case was that of a child, brought to St. Bartholomew's Hospital in a state of insensibility, which lay for a week without motion or consciousness, and then died. The whole brain was as hard as the white of a boiled egg; but nothing could be learnt of the previous history. The brain of the celebrated Pascal was found to be indurated, and he died not only with hallucinations, but also labouring under a species of religious monomania.

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* *Répertoire Général d'Anatomie et de Physiologie*, 1828.

The symptoms of abscess of the brain are likewise extremely obscure. In a case treated for disease of the nose, the man made no complaint of his head, and was able to sit up in bed, and to assist himself in every way, when he died suddenly in the night. To the surprise of everybody, an abscess of considerable size was found in the left hemisphere above the ventricle. In other cases, according to Dr. Baillie, pain, delirium, coma, and palsy are the symptoms observed.

The symptoms of hydatids of the brain are often very obscure. The slowness with which they form probably often causes the brain to become accustomed to their presence, and consequently they do not give rise to any very prominent symptom; Cruveilhier gives a plate of a hydatid occupying the internal surface of the right hemisphere, immediately above the corpus callosum, and which caused no cerebral symptoms. Dr. Baillie also gives a case in which a serous cyst, as large as a gooseberry, pressed on the optic nerves at their junction, and yet the pupils were not dilated, nor the eye-sight impaired till within a day or two of the patient's death. In other cases they cause severe headache, palsy, loss of sight, or of other sense, and also absorption of the bones of the cranium, coma, and death.

Atrophy of the brain is usually congenital, or the consequence of some severe hydrocephalic disease, and the parties suffering are generally idiotic, and possess but little use of their limbs. Andral gives a singular case in which the patient, a girl, though an idiot, was able to do little errands in the neighbouring villages, and lived to an early adult age, yet when examined after death was found to have no trace of cerebellum.

Hypertrophy of the brain is usually connected with hydrocephalus, or is probably caused by some inflammatory action. These persons seldom possess much power of intellect, but their faculties generally are less impaired than in cases of atrophy.

Diagnosis.—The great difficulty in the diagnosis of acute ramollissement is to distinguish it from apoplexy. The diagnostic symptom most marked, however, is the early delirium and hallucinations of the senses, occuring before the brain has time after the fit to become inflamed, a circumstance which does not ordinarily take place till four to ten days after the attack.

Prognosis.—The prognosis in every case of encephalitis is grave; but, as far as we can judge, even acute cases do recover, and live many years afterwards.

Treatment.—In diffuse inflammation of the brain arising from mechanical injuries, there can be no doubt that bleeding and the antiphlogistic treatment generally are most beneficial when employed with a wise discretion. When, however, the same inflammation depends on the action of a morbid poison, it is necessary to warn the inexperienced practitioner that such measures must be employed with the greatest caution, and in most cases are better omitted altogether; for we find in many cases of typhus fever, in which the brain is probably partially softened, that the patient recovers under a powerful stimulant treatment.

In idiopathic ramollissement of the brain, the treatment can hardly be said to be yet determined; but there is good reason to suppose that bleeding is injurious, and that most advantage is derived from the use of tonics, and of a nutritive diet. "If it was demonstrated," says Andral, "that ramollissement of the brain, was a form of inflammation, the therapeutic indications would be easy, for we should only have to apportion the antiphlogistic treatment to the strength of the patient; but so far from this treatment being successful, abundant depletion has been followed by a notable augmentation of the cerebral affection." Indeed every practitioner must often have observed, that when the brain has been softened, every attempt to relieve the patient by bleeding has not only entirely failed, but the fits of apoplexy have returned, or the hemiplegia has been increased. On the contrary, when the acute cases have been supported with wine, &c., these have sometimes recovered, though mutilated. Again, in the more chronic and fatal forms of the disease life is evidently prolonged by mild tonics, attention to the bowels, and by a liberal and nutritious diet. Beyond this the medical treatment of ramollissement of the brain is still a problem, with only a few unsure data to guide us for its solution. Little has been done to determine the treatment of induration, of suppuration, or of the other forms of cerebral disease that have been mentioned.

Of Inflammation of the Membranes of the Spinal Cord.

Remote Causes.—The membranes of the cord, unlike those of the brain, are little acted upon by morbid poisons. The most frequent remote causes of inflammation of these tissues are, exposure to cold or wet, mechanical injuries, caries of the vertebræ, and perhaps diseases originating in the substance of the cord itself.

Predisposing Causes.—This class of disease is incident to every age, but is most common in childhood and in adult age.

Pathology.—The chromatous inflammations of the membranes of the cord are the same as those of the membranes of the brain,—or the diffuse, the serous, the adhesive, the suppurative, the ulcerative, and the gangrenous.

The rachidian dura mater may be inflamed either at its free or at its adherent surface. On examining the spinal canal, after tetanus or caries of the vertebræ, the cellular tissue uniting the dura mater to the walls of this cavity is often found greatly loaded with venous blood; and in some instances is broken down, so that the dura mater is entirely detached; which two circumstances being conjoined distinctly show this state of parts to be the result of inflammation, and not of congestion. This inflammation may terminate by resolution, or it may proceed, and serum be effused, as in two cases reported by Bergamaschi, in which he found that fluid poured out between the osseous structure and the dura mater. The adherent surface also is liable to the adhesive inflammation; for in the case of William Banks, who died in St. George's Hospital, on the 64th day after a fall from a scaffold 40 feet high, the fourth dorsal vertebra was not only found fractured, but there was a slight effusion of blood and *lymph* between the osseous part of the spinal canal and the dura mater. In another instance in which there was caries of the 8th, 9th, and 10th dorsal vertebræ, the adherent surface was not only injected and red, but contained a matter which appeared to be pus.

Besides the diffuse, the serous, the adhesive, and the suppurative inflammations, the dura mater appears liable to the ulcerative and to the gangrenous inflammations. In a case given by Ollivier,* of a druggist who died on the twentieth day after suffering from lumbar pains, with rigidity of the trunk and lower extremities, together with tetanic spasms, there was found, on cutting through the muscles of the lumbar region, half an ounce of pus, or more, which was traced to the cavity of the arachnoid, the rachidian dura mater having ulcerated and ruptured. The following case is an instance of gangrene of the dura mater of the cord:—A man, while carrying a heavy load on his back, fell, and fractured the ninth and tenth dorsal vertebræ. The operation of trephining the fractured parts was performed by Mr. Tyrrel, in St. Thomas's Hospital. The man, however, died on the fifteenth day, and the portion of the dura mater which had been exposed by the operation was black, and similar to that of parts threatened with gangrene. In another case, also, a young woman, aged 27, was knocked down in the Rue Montmartre by an old woman falling upon her, out of a five-pair-of-stairs window in the delirium of fever, and had the fourth dorsal vertebra fractured. This patient lingered till the forty-ninth day, when, on opening the spinal canal, the dura mater at the injured part was found to be soft, easily torn, and black.

The dura mater of the rachidian canal is also liable to some achromatous inflammations. In a rachitic patient, 60 years old, only four feet high, and who had never been able to walk without crutches on account of a remarkable bandiness of his legs and thighs, there was found, besides other lesions, caries of the second cervical vertebra, and also several osseous depositions, as well as thickening of the dura mater, at the diseased part.

The spinal *arachnoid* and *pia mater* are liable to all the chromatous inflammations of the corresponding membranes of the brain, as the diffuse, the serous, the adhesive, the suppurative, and the ulcerative.

Diffuse inflammation of all the folds of the arachnoid has often been observed, those membranes being red and injected for a greater or less extent, till in some instances it has occupied nearly the whole length of the spinal canal; and it is probable, although the opportunities of examining the spinal cord are comparatively rare, that the membrane is not only red but dry.

Effusion of serum, both into the cavity and into the sac of the spinal arachnoid, is not uncommon. Lymph is more rarely effused, yet has occasionally been found organized, uniting the opposite sides of the sac together. The pia mater and the arachnoid have also been found adherent after effusion of lymph into the cavity; and instances have occurred in which all the layers of the spinal membranes have been found united to each other.

Suppurative inflammation of the spinal membranes also occasionally takes place. This form of inflammation, according to Ollivier, only occurs in the cavity of the arachnoid—"toujours l'exsudation puriforme est sous-jacente à l'arachnoide." This physician gives as an instance, the case of François Sabatier, aged 28, who, without any known cause, was seized with dorsal pains, lassitude, and weakness in all his limbs, and, as the disease advanced, with tetanic opisthotonos, which returned at irregular intervals. He died on the ninth day, and on examining the spinal canal the arachnoid *cavity* throughout its whole extent was filled with pus. The same author gives other similar cases, and finds that the suppurative inflammation usually co-exists with the adhesive inflammation.

Besides the chromatous inflammations the membranes of the cord are occasionally the seat of achromatous inflammation, whence result bony and cartilaginous formations. These deposits vary in size from a pin's head to patches of five or six lines in diameter, seldom exceeding in thickness a melon-seed; and this thickness, as in the melon-seed, diminishes from the centre to the circumference. They are sometimes exceedingly numerous, and sometimes cover nearly the whole extent of the membrane. Andral has met with them external to the dura mater, and as large as peas. Ollivier says they are formed on the rachidian arachnoid, while Dr. Sharpey and Dr. Hodgkin affirm they are formed between its layers.

Symptoms.—The symptoms of rachidian arachnitis are often obscure at the commencement, but the disease once formed, pains of the back, with affection of the muscles, and retention of urine, are the pathognomic signs of the disease.

A greater or less degree of pain of the back, proceeding from the point of greatest intensity of inflammation, is one of the most prominent symptoms. It may be limited to one vertebra, or may extend along the whole of the spine, and even down the thighs. Sometimes it is continued, sometimes intermittent, and in either case it may be of uniform intensity or else darting. Occasionally it is so severe as to cause the patient to shriek out. In one case the patient was so harassed that he could not lie down, but kept walking about the room in a state of extreme agitation, grasping the lower part of his back with his hands through the intensity of the pain; he had no interval of ease, and was sometimes incoherent and unmanageable. He died, and pus was found in the spinal arachnoid cavity.

The affection of the muscles varies from simple stiffness of the part to opisthotonos. This latter symptom is often limited to the neck or trunk, without the limbs participating, as in a case given by Rayer, in which the trunk and neck were drawn backwards, while the patient walked freely till the time of his death. In the case of a waggoner thrown off his cart and pitched on his neck and shoulders; the neck was stiff, the jaw was locked, the body convulsed, and the patient delirious. It was not till the twelfth day, however, that the lower extremities became affected and palsied, when the patient sunk into a typhoid state and died. A large quantity of pus was likewise found in the spinal arachnoid cavity in this case.

Neither the pulse nor the tongue are much affected at the commencement of this affection, but towards its close the one becomes rapid and feeble, and the other brown and dry, and the teeth fuliginous; the patient's state is now typhoid, and he dies delirious or comatose.

Retention of urine generally persists from the beginning to the termination of the disease. Constipation often exists to a great degree at first, but afterwards the bowels act regularly, or even suffer from diarrhœa.

The duration of this affection is very various; in acute spinal arachnitis life is seldom preserved beyond a fortnight or three weeks; but if the case be slight the patient often recovers in six weeks or two months; while in chronic cases, if the disease be of a character to terminate unfavourably, the period may be much longer.

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* Vol. ii. p. 569.

Diagnosis.—The symptoms which distinguish spinal arachnitis from inflammation of the substance of the cord are *pain* and *contraction* or *convulsions* of the limbs; for in pure myelitis there is seldom any severe or constant pain, while the limbs are generally palsied and their sensations benumbed or lost. It is distinguished from rheumatic lumbago or psoas abscess by the affection of the limbs and of the bladder.

Prognosis.—Many authorities consider spinal arachnitis to be incurable, but many cases marked by the characteristic symptoms in a mild form do recover.

Treatment.—Spinal arachnitis, seldom depending on a morbid poison, is perhaps, in all cases, best treated by bleeding and mild purgatives. General bleeding is sometimes necessary; but local bleeding, either by cupping or leeches, along the vertebral column, is most useful, and perhaps cannot be omitted with safety. The medical treatment consists in moderate purging by the neutral salts, as the sulphate of soda or the sulphate of magnesia; for as these act on the bladder as well as on the bowels, they are probably the best medicines. Whatever purgative, however, may be selected, it will be proper to continue it with the tinct. hyoscyami or other mild opiate, to procure the patient some relief from his sufferings. Mercury, it should be stated, is not supposed to exert that power in meningitis of the cord which it possesses over inflammation of serous membranes generally. The warm bath is an excellent adjuvant in the early stages of the disease; whilst in the latter stages blisters, setons, moxæ, or the ungentum antimonii tararizati are more beneficial, or at least as a last resource are deserving a trial.

An abstinence from all animal diet should be imperiously prescribed throughout the whole course of the disease.

OF MYELITIS, OR INFLAMMATION OF THE SUBSTANCE OF THE SPINAL CORD.

Remote Cause.—The substance of the cord is acted upon by a very small number of poisons, and, consequently, the most common causes of disease of this portion of the nervous system are accidental violence, as blows or falls. Affections of the cord, however, sometimes occur idiopathically, and the constitutional causes producing it are exceedingly undetermined. Vogel considers them to be often owing to a suppression of the menses in the female, and to the suppression of a hæmorrhoidal flux in the male, while others attribute them to sitting in damp or wet clothes. Caries of the bones must also be an occasional cause.

Predisposing Causes.—No age, perhaps, is exempt from myelitis, but it occurs more frequently from ten years old and upwards. It is most common, however, in adult age, and more frequently attacks the male than the female sex.

Pathology.—As the spinal cord is a continuation of the brain, and similarly composed of medullary and cineritious matter, it is reasonable to expect its diseases will be similar, and such is the case. The chromatous inflammation of the cord is limited to the diffuse inflammation, which is characterized by a few more bloody points than usual, or else by a slight red or rose-colour suffusion. Dr. Budd mentions a case in which a man fell to the bottom of a barge, fracturing the third, fourth, and fifth cervical vertebræ. He died seven days after the accident, and there was found opposite the fourth cervical vertebra a portion of cord which felt soft, and on being divided it was found converted into a red semi-fluid pulp. The membranes were sound.

The most common affection, however, of the spinal cord is the *achromatous* ramollissement or serous inflammation. In this form of disease the substance of the cord is greatly broken down and softened, so as to be sometimes reduced to a mere pulp. Ollivier mentions a case in which it was so diffluent as to give the sensation of fluctuation under the finger. This disorganization sometimes embraces the whole thickness of the cord, sometimes only one of its columns, so that it is of very variable extent. It is constant, however, that the centre or *grey* substance of the cord is more softened than that of the circumference or white substance. The ramollissement may exist in the cervical, dorsal, or lumbar portions of the spine; but it is most common in the lumbar, and after that in the cervical portions, or in those parts which contain the greatest quantity of *grey* substance, and, consequently, the greatest number of blood-vessels. The part affected is generally swollen, a circumstance more striking than in similar diseases of the brain, because the spinal canal is large in proportion to its contents, compared with the cranium. The softened part is also generally ash-coloured or white.

Some pathologists have regarded ramollissement of the cord as a particular alteration of the nervous system, as resembling the effects of a contusion of soft parts, and the result of the shock. It often occurs, however, when no shock has been received, and has not the least resemblance to a contusion of soft parts; and as this singular state of parts is produced in the brain by morbid poisons, the admitted causes of inflammation, as well as accidents, there seems no hypothesis so satisfactory as that which attributes it to the result of an achromatous inflammation.

Induration of the spinal substance is another result of achromatous myelitis, and is probably a further stage of inflammation, corresponding to the adhesive inflammation. Portal states he has found the cord of a cartilaginous hardness, while the membranes were red and inflamed; and Abercrombie gives a similar case.

The substance of the cord may likewise fall into suppurative inflammation; and some authorities conceive that the pus may be infiltrated, as well as collected into an abscess. The fact of infiltration is perhaps questionable, but there can be no doubt of an abscess having occasionally formed in the substance of the cord. Velpeau,[*] indeed, gives a case in which an abscess was formed in the right column of the cervical portion of the cord, three inches long and two lines broad, while a smaller one existed also in the left column. This form of the disease is also void of colour, and is achromatous.

Gangrene of the cord has been seen, but is extremely rare.

In some cases the spinal cord has been observed hypertrophied, either in its whole extent or partially. In the former case it fills the whole cavity, and is exactly applied to the walls of the osseous canal. Laënnec has observed this hypertrophy in all the extent of the cord; Andral has seen it limited to the cervical region of an epileptic child, and Hutin has given a case in which this hypertrophy existed from the occipital foramen to the middle of the dorsal region.

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[*] *Revue Méd. Franç. et Etrang.*, vol. ii. p. 217.

Atrophy of the cord is more rare than of the brain, but it sometimes exists, and it may be general or partial. Ollivier has twice seen this atrophy in all the extent of the cord. In one case it was reduced to one-half its usual size, and in the other it was one-third less. Magendie has seen a third case, in which the cord was not only diminished in size, but also indurated.

Of partial atrophy of the cord, M. Ollivier has seen a case in which the cord was so contracted at the last dorsal vertehra that it did not exceed three and a half lines from side to side, and little more than two lines from back to front. In another case of caries of the vertebræ, all the white substance had disappeared, and exposed the central grey substance. In another, the cord at the lumbar region was reduced to the size of a goose quill. Sometimes partial atrophy of the cord has been caused by the pressure of hydatids, or from a dislocation or other diseased state of the atlas or dentatus, or from a contracted occipital foramen.

Some few instances of ramollissement have been observed, limited to the anterior or posterior columns of the cord, but they have not supported Sir Charles Bell's doctrine of the former being the exclusive agents of motion, and the latter of sensation.

Symptoms.—The symptoms of myelitis are in general limited to the parts below the injury. In a few cases, however, the accidents are reflected from below upwards. In general both upper or both lower limbs are affected; but in a few instances only one limb. The first symptom is numbness, with a sensation of coldness down the limb. Shortly afterwards the patient complains of pain in the back, corresponding to the seat of greatest intensity of the inflammation; but this is not constant, for pain is often absent, even when we make pressure with the finger over the spinous processes of the affected part. These symptoms are succeeded by impaired motion, and often likewise of sensation of one or more limbs; and this is followed by paraplegia, or other form of palsy. The palsied limbs may be either relaxed or permanently contracted: thus the hand may be bent on the upper arm, or a leg be flexed upon the thigh; or the affected limb may be attacked with convulsive twitchings, or else may beat incessantly the devil's tattoo. As the disease advances the bladder becomes affected, and the patient is either incapable of retaining his urine, from the sphincters being palsied, or else it is suppressed from their permanent contraction. The action of the bowels is slow in the first instance; but towards the close of the disease the patient is often purged, and the stools pass involuntarily. If the disease be the result of an accident, the pulse is at first rapid and full; but if it be spontaneous the pulse is generally natural, until the powers of life are broken down by the continuance of the affection. As the scene draws towards its close, the nates and the prominent parts of the pelvic region, on which the body rests, ulcerate extensively, so that deep sloughs form, and although the patient, from anæsthesia, suffers no pain, he nevertheless ultimately sinks exhausted.

In injuries of the spine, from wounds and contusions, some differences in the symptoms have been observed, according to the seat of the injury. It is well known, for example, if the spinal cord be lacerated or divided above the origin of the phrenic nerves, or above the third cervical vertebra, death is the immediate consequence, the nervous influence being no longer transmitted to the diaphragm and other muscles of respiration. Petit gives two remarkable instances of this. The only son of a working man went into the shop of a neighbour, who, in play, raised the child from the ground by putting one hand under his chin, and the other at the back of his head. The child, only six or seven years old, struggled, dislocated his head, and died immediately. The father coming in at that instant, and transported with anger, threw a saddler's knife at the man, and lodged the cutting part in the back of his neck, and this man died within an hour. There are a few cases, however, in which disease of these parts has not been immediately fatal. Thus the odontoid process has been destroyed by caries, or the second cervical vertebra has been dislocated, and yet the patient has continued to live for some months, or even some years. A remarkable case of a diminished area of the occipital foramen, whence resulted great pressure on the cord, was met with by Mr. Holberton,* and yet the patient lived more than two years, the most remarkable symptom being an extremely low pulse. In these chronic cases the formation of the disease is slow, so that the cord becomes accustomed to the gradually increasing pressure, and the respiration consequently still continues to be carried on principally, though feebly, by the muscles of the neck and shoulders, the diaphragm and intercostal muscles being more or less palsied.

When the injury, however, is below the origin of the phrenic nerves, or at the level of the fifth and sixth cervical vertebræ, the inspiration is free, but the expiration is laborious, for the intercostal and abdominal muscles are paralyzed and incapable of assisting in that process. The patient can yawn, for that is an act accompanied by inspiration; but he cannot sneeze, for that is an act accompanied by expiration. At this point, also, the upper extremities are still palsied, both as relates to motion and to sensation. When the palsy of motion and of sensation is complete, the patient, says Sir Benjamin Brodie, during the short remaining period of his life, presents the extraordinary phenomenon of a living head, with its sensibility and muscular powers unimpaired, attached to a trunk and extremities of whose existence he is only conscious by the sense of sight. Another very common symptom connected with injuries of the upper portion of the cord is priapism. This affection shows itself about the second or third day after the accident, and generally subsides after the first fortnight. It sometimes occurs even when all sensation in the part itself is destroyed, so that the patient is not sensible even when the catheter is introduced.

If the injury be in the situation of the sixth and seventh cervical vertebræ, the palsy of motion and of sensation is frequently imperfect of the upper extremities, while it is complete in the trunk and lower extremities.

When the spinal cord has been injured in the part corresponding to the first dorsal vertehra, the upper extremities may still suffer from an incomplete palsy either of motion or of sensation, or both. When, however, the seat of the lesion is in a line with the second dorsal vertebra, the sensation and motion of the upper extremities remain unimpaired, but the respiration is still difficult from the palsy of the intercostal and abdominal muscles.

The symptoms, when the injury is in the lumbar region, are not dissimilar to that of the dorsal region, except that the respiration is unaffected. Dupuytren has remarked, also, when the lumbar region is the seat of the disease, that the sound introduced into the bladder is more frequently covered with incrustations, and that the patient also more commonly suffers from ulceration of the nates; but these symptoms perhaps result only in consequence of the patient surviving for a longer period than when the superior portions of the cord are affected.

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* *Med. Chir. Trans.* vol. xxiv. p. 180.

In chronic affections of the cord the palsied limbs usually waste and become atrophied.

In cases in which a limb has suffered from palsy, both of sensation and of motion, some singular phenomena have been observed; or that when a stimulus has been applied to the palsied limb, it often occasions involuntary contraction of the muscles of that limb. Thus, when a feather is passed lightly over the hollow of the foot, as in tickling, convulsions occur in the limb although the patient is quite unconscious that anything is touching his foot. These movements also are quite independent of volition, and vary in extent and force inversely with the degree of voluntary power possessed by the affected limb, being most forcible when the loss of voluntary power is most complete, and diminishes gradually in extent and force as that power is increased. In some instances, by irritating one leg, movements were caused not only in that leg, but also in the other leg; and similar phenomena have been observed by Sir G. Blane and others, in decapitated animals, showing even a portion of the cord may furnish a supply of nervous energy after disease has interrupted its connexion with the brain.

Diagnosis.—Diseases of the spinal cord, and diseases of the brain, are often followed by nearly similar symptoms; and consequently the one seat may be confounded with the other. But the history of the case, or whether it has or has not been preceded by a fit of apoplexy or of epilepsy, will often enable us to determine the particular seat of the disorder. Myelitis is distinguished from lumbago, psoas abscess, and hip disease by the absence of pain, and by the existence of the palsy.

Another point of diagnosis is, can we determine from the symptoms whether the cord or the membranes be the seat of the disease? Baglivi and Pallisio trephined the spine in the dorsal regions of many dogs. These animals did not appear to suffer when the knife pierced the substance of the cord; but if the dura mater alone was pricked, they fell into convulsions. The same phenomena appear in many cases to follow in the human subject, namely, that when the cord alone is diseased, the patient suffers no pain; while on the contrary, when the membranes are diseased, he often suffers most severe pain, with convulsive motions of the limbs.

Prognosis.—It is certain that many cases of severe contusion of the spine do recover, although it seems probable some organic lesion must have taken place. There seems likewise no reason to doubt that as many perfectly recover from superficial inflammatory lesions of the brain after fever, so also that many slight inflammatory affections of the substance of the cord may subside, and the patient do well. Many cases, indeed, even when the bladder is slightly affected, do recover. If, however, the disease be of more than a few weeks' continuance the prognosis is always grave. Still some few do recover, the leg being withered. But more commonly the disease runs on, and the patient at length falls after a long struggle.

Treatment.—In classing ramollissement of the cord with inflammation, it might appear necessarily to infer that the treatment should be strictly antiphlogistical. It is questionable, however, whether this mode is at any time advantageous; and it may be laid down as a general rule, that bleeding ought not to be had recourse to after palsy has occurred. Previous to that symptom it may be admissible; but, even then, it sometimes happens that the symptoms are aggravated almost as soon as the blood flows. After the palsy has manifested itself, bleeding is plainly improper; for, the nervous influence being intercepted, the powers of the lower part of the body are so reduced that it readily runs into gangrene, a tendency which loss of blood greatly increases. "It is a great mistake," says Sir Benjamin Brodie, "to think blood-letting always proper." "I have no reason to think blood-letting arrests softening."

As bleeding rather aggravates than amends the symptoms, the greater number of chances of saving the patient rest on our acting on the alimentary canal so as to produce three or four motions in the 24 hours, and thus creating such a derivation as in some degree to relieve the parts: at least the greater number of patients that do recover are restored by these means. The purgative is not perhaps important; but as the neutral salts act not only on the intestines, but also on the bladder, that class of remedies is generally preferred. At the same time that the bowels are kept free, the patient should be allowed a liberal supply of wine, or from six to eight ounces daily, and should be indulged in animal food at least once a day. If these means fail, and the disease proceed, we have no specific remedy. Some physicians have recommended small doses of the tinct. of cantharides, but the result has been anything but satisfactory. Of the untried medicines perhaps the secale cornutum is of the greatest promise.

With respect to local applications, as blisters, moxas, or setons, they are possible remedies, but the tendency to gangrene renders their application of doubtful utility. When had recourse to, however, it would perhaps be better to apply them above the seat of the disease than immediately over it, the greater vitality of the superior parts giving us greater assurance of our being able to heal them.

Of Inflammation and other Simple Organic Diseases of Structure of the Alimentary Canal.

The mouth, the great adit to the alimentary canal, is often inflamed. The mucous membrane of the tongue, the gums, and of the cheek and lips, is liable to inflammation and ulceration from a variety of causes, as sharp corners of the teeth, or rugged tartar on their external surfaces. These affections are seldom of much moment; and simple ulcers may be readily made to heal by abstracting the exciting causes, and the application of some astringent wash, or of some mild ointment. Ulceration of the mouth, also, when produced by mercury, even supposing the tongue to protrude, for the most part readily heals on leaving off the use of the medicine. In some few cases, however, the inflammation thus produced does not readily subside, and the salivation continues, the ulceration extends, portions of the jaw exfoliate, and in a few cases death results. In these severe cases it is necessary to support the patient by wine and sago, and by quina, or other tonic medicine, and also to wash the mouth frequently with an acid gargle, or with a solution of the chlorides.

Besides these affections, the bones of the palate sometimes exfoliate, an affection most commonly the result of the syphilitic poison. The mucous membrane of the antrum maxillare is occasionally inflamed, when the symptoms are a violent throbbing pain in the part affected, in the temples, and in the teeth. The side of the face is likewise swelled from infiltration of all the soft parts, and the Schneiderian membrane of the corresponding nostril is generally red and swollen. If the disease terminates in suppuration, and no exit for the pus exists, enlargement of the cavity takes place, so that the ossa malæ project, or the orbit of the eye is thrust upwards. The mucous membrane also lining the antrum becomes thickened, when the small aperture by which the antrum and nostril communicate is closed, and no outlet left for the accumulating fluid. If the disease be not interfered with, the matter most usually makes its way by ulceration into the socket of a decayed tooth, or the anterior parietes is absorbed, and it now flows by the nose, by the side of the canine or small molar teeth, greatly annoying the patient by its fœtor and by the slowness with which the abscess is emptied. This affection, unless it is prevented forming by bleeding, fomentations, and by purging, falls in the latter stage entirely into the hands of the surgeon. There are likewise some other minor diseases of the mouth, as gum-boils, serous cysts, ranulæ, and the occlusion of the salivary ducts by calcareous deposits, but these also are surgical. The diseases of that part of the mouth termed the throat will be treated of under the head of the respiratory organs, as more intimately connected with the symptoms of disease of those parts. There are, however, two diseases of the mouth of sufficient importance to attract the attention of the physician, as the various forms of stomatis termed aphthæ.

OF APHTHÆ, OR INFLAMMATION OF THE MUCOUS MEMBRANE OF THE MOUTH. (*Thrush.*)

1019 cases are reported to have died of thrush in 1839, in England and Wales.

Remote Cause.—The remote causes of this affection are very various. It sometimes arises from mere derangement of the stomach and bowels, but more commonly from general debility; it is also the concomitant of the latter stages of almost every severe disease. Besides these causes, some peculiar states of the atmosphere appear to engender it, for it is epidemic in some years and hardly known in others. Thus Billard states, that out of 917 healthy children 228 were attacked in 1826; and, according to Valleix, out of 657 healthy children 140 were attacked in 1834, and 99 died. When epidemic, it appears to have a *contagious* property; for, according to Burns, a healthy child sucking the breast immediately after a diseased child, has taken the infection. M. Taupin says he has seen it communicated to a healthy child drinking out of the same glass, or eating with the same spoon, after an infected child. This physician also says, that at the Hôpital des Enfans it appears almost always as an epidemic.

Predisposing Causes.—This class of disease is extremely common in childhood, so that, according to Burns, every child has at some period or other an attack. In the adult, however, it is extremely rare as an idiopathic affection; but it is occasionally met with as a result of severe disease, as phthisis. Taking all the forms of this affection, M. Taupin says he has observed them in one case in twenty in children, and but only in one case out of 1900 sick adults. It is more frequent in boys than in girls. The most common age is while suckling, or during the two periods of dentition.

Pathology.—These inflammations of the mucous membrane of the mouth are of three kinds,—the characteristic of the first being an exudation of points of lymph of the size of a pin's head, or larger, over the surface generally of the mucous membrane of the cheeks, tongue, and gums; the second is marked by a thickening of the epithelium, with points of ulceration of that membrane, the base of the ulcer being the denuded tongue, &c., red and sore to the touch. These two forms of aphthæ are seldom idiopathic, but are most commonly only seen in the last flickerings of the lamp of life, and when the patient is wasted by long and chronic disease. The third variety is when the ulcer, though similarly situated, affects the deeper-seated tissues as well as the epithelium, and often occurs in children in the best health. This disease is termed the *thrush*, and we shall now limit our observations to this affection.

Aphthæ, or the *thrush*, consists of a number of small ulcers of the mucous membrane of the mouth, with edges either elevated or *à pic*, and with a greyish base. Authors have allotted to these a great number of different seats, as the epithelium, the mucous follicles, and the substance of the mucous membrane itself; but it is probable all these parts may be affected. They have also admitted two principal varieties of this affection, or aphthæ simplices, and aphthæ contagiosæ, the one being contagious, the other not so; but this difference of property is certainly not very clearly proved.

Aphthæ simplices are characterized by a number of little white transparent vesicles, which shortly rupture, leaving a small *round* white ulcer, surrounded by a reddish areola. The course of this disease is not determined, but it varies from a few days to two, three, or four weeks, and is supposed to be kept up by a succession of crops. This form of disease is found to exist in the pharynx, œsophagus, stomach, small and large intestines, and also about the anus.

The aphthæ contagiosæ differ little from the preceding, except that the ulcers are of an irregular oblong, and in size and shape about that of a barleycorn. They usually affect the edges of the tongue, the sides of the frænum, the outside of the gums, and the interior of the cheek; but in no instance has it been observed that these ulcers extend to the pharynx, or other part of the alimentary or respiratory canals. The course of these ulcers is not well determined; but sometimes they disappear in a week, while in other cases they will last for a month or six weeks; the same ulcers either continuing, or else being renewed by a succession of crops. This affection is usually accompanied by an abundant salivation, and sometimes by an enlargement of the glands of the neck. In this form of aphthæ, likewise, the poison appears to have an ultimate action on the parenchymatous substance of the lungs, terminating in a loose spongy hepatization.

Symptoms.—Some local pain and heat of the mouth, some difficulty in swallowing or suckling, with an alteration in the timbre of the voice; also some slight febrile re-action, causing the child to be fretful, are the principal symptoms marking aphthæ simplices.

The symptoms of thrush, or of aphthæ contagiosæ, are fever, which sometimes causes the child to be drowsy, oppressed, and hot for some hours to two or three days before the aphthæ appear. The ulceration established, the fever proceeds, often accompanied by much delirium and subsultus tendinum. The stomach and bowels also are much deranged, the stools green and acrid, so as to excoriate the rectum, and cause much pain. The pulse also is quick, and the tongue, though white at first, often becomes brown and dry; and these symptoms continue for two, three, or four weeks, when the child recovers, or else, perhaps, from some secondary action on the lungs, he ultimately sinks.

Treatment.—The treatment of aphthæ simplices depends on restoring the disordered bowels or other parts that may be diseased to their usual healthy actions; but it is necessary to add, that this treatment should be tonic, at least as far as the case admits of; and of tonics the infusi aurantii c. tinct. aurantii, are among the best for children. A small quantity of wine, mixed with three parts of water, may also be given once or twice a day.

The treatment of the aphthæ contagiosæ, or thrush, even when there is much fever and delirium, is also best treated on the tonic principle, and especially by small quantities of wine, together with attention to the bowels. Some practitioners add to this a local treatment of the borate of soda, mixed with honey, applied to the ulcers; others wash the mouth with infusion of roses, or else with a solution of zinc or other lotion; but these applications are not important. The treatment of the pneumonia, which sometimes follows this affection, is not determined. The little patient's diet should be slops, sago, arrow-root, broths, and light puddings.

Of Inflammation and of other Simple Diseases of Structure of the Mucous Membrane of the Œsophagus.

Œsophagitis—is an inflammation of the mucous membrane of the œsophagus.

Remote Cause.—Inflammation of the œsophagus is a rare disease, for the morbid poisons have little influence over this portion of the alimentary canal, and the general causes, as they are termed, as atmospheric vicissitudes, are in like manner seldom followed by inflammatory affections of this part. The most frequent causes of inflammation of the œsophagus are children accidentally drinking boiling water out of the spout of a tea-kettle; swallowing corrosive liquids, as the mineral acids; and wounds most commonly inflicted in the act of committing suicide.

Predisposing Causes.—Children a few days old are sometimes affected with slight inflammatory affections of the œsophagus; and such few other cases as do occur may probably take place at every period of life.

Pathology.—The mucous membrane of the œsophagus is liable to the diffuse, to the adhesive, to the ulcerative, and to the gangrenous inflammations; but no instance is known of its being the seat of serous or of suppurative inflammation, without breach of surface.

Diffuse inflammation of the mucous membrane of the œsophagus is characterized by a deep redness of the part affected, generally terminating by resolution, but occasionally followed by separation of the cuticle. If the disease proceeds, lymph is thrown out. In new-born children points of lymph are often found lying on the mucous membrane of the œsophagus, being apparently an extension of the thrush affecting the mouth and pharynx. Andral has once seen in a girl twelve years old lymph thrown out after the manner of broad bands in the pharynx, œsophagus, and stomach. After puberty this form of inflammation is still more rare, but there are some few instances. Cruveilhier says that he found among the preparations of Dupuytren a very remarkable example of inflammation of the œsophagus, terminating in the formation of a false membrane, which coated this canal throughout its whole length. Dr. Abercrombie also gives the case of a gentleman, aged twenty-six, who caught cold and died in about three weeks. The whole of the pharynx was covered by a loose adventitious membrane, which also extended over the epiglottis, and portions of it were found lying in small irregular masses within the larynx, at the upper part. A similar membrane was traced through the whole extent of the inner surface of the œsophagus, quite to the cardiac orifice.

Besides lymph being thrown out, the mucous membrane of the œsophagus may also ulcerate. Dr. Wilson, of the Middlesex Hospital, gives the case of a young woman, aged twenty-one, who had swallowed, as she supposed, about a table-spoonful of oil of vitriol. This patient survived forty-five weeks and three days. The œsophagus for the lower two-thirds was thickened and narrowed, and the seat of an irregular cicatrix, showing that an ulcer had existed and had healed.

These ulcers, in general, form on the anterior portion of the œsophagus, and by continued extension they at last penetrate the posterior surface of the larynx, so that the patient often dies suffocated from the escape of food into the lungs. Occasionally the ulceration takes place from without inwards. A lady took cold, as she imagined, by riding in her carriage with the window down. Much difficulty of swallowing ensued, and the probang could not be passed into the stomach. At the end of a few weeks she was seized with a sudden vomiting, and threw up a large quantity of matter, after which she rapidly recovered. There can be no doubt that an abscess had formed in the submucous tissue, which burst into the œsophagus. Mr. Travers has also given a case of a deep-seated tumor found on the right side of the trachea, which opened at length into the œsophagus, and the patient passed pus both by the mouth and anus. Wilmer has given the case of a patient who was wounded in the mouth by a small sword. An abscess formed, which opened internally into the œsophagus, and externally in the neck, and the pus which escaped was often mixed with alimentary matters. The part became *gangrened*—the carotid was laid bare—and the patient died.

Dilatation.—The œsophagus may be partially or generally dilated. Dr. Hanny (*Edin. Med. Surg. Jour.* vol. lx. p. 66,) gives a case of general dilatation in a young man aged thirty, who had suffered from dysphagia, and in whom the œsophagus was found dilated to the size of a child's arm, measuring six inches in circumference. The walls were thickened, but without ulceration or carcinomatous deposit. Instances of partial dilatation of the œsophagus are much more common, and very constantly exist when the cardiac orifice is obstructed, or the seat of cancerous deposit. In general there is only one pouch, capable perhaps of containing a large portion of an ordinary dinner; but in a few instances the dilatation is multiplex; and an instance of this is given by M. Roennow of a young person who suffered much from offensive breath, and in whom the œsophagus was found, after death, dilated into several cavities, containing the remains of aliment in a putrid state.

Stricture of the œsophagus is occasionally met with, and it may be partial or general. In cases of poisoning with the mineral acids, the whole œsophageal canal is found constricted and narrowed; the mucous membrane puckered up and contracted so as greatly to diminish the calibre of the canal generally. More commonly the stricture is partial; one circular muscular fibre perhaps having abnormally contracted, and in this state been bound down by adhesive inflammation, diminishing the diameter of the canal at that part to at least one-half. Dr. Baillie mentions a case in which from this cause the diameter of the œsophagus was so reduced as hardly to allow a garden pea to pass, yet in all other respects the œsophagus was healthy. The party had laboured for many years under a difficulty of swallowing, and could only pass substances of an extremely minute size into the stomach. A beautiful specimen of this description is to be found in the museum of St. Thomas's Hospital.

Ramollissement.—Guersent and Bouillaud have given several cases of rupture of the œsophagus in consequence of ramollissement. The following instance is related by Boerhaave. The Baron Wassonmaer, of an excellent constitution, but subject to the gout, had contracted the habit of taking an emetic after every excess at table, which with him was not infrequent. One evening, after a copious repast, his emetic not producing its usual effect, he made some efforts to assist it; all at once, however, he shrieked out, threw himself on the ground, and complained of atrocious pain, and of having felt something burst at the superior portion of his stomach. He died in eighteen hours. On opening the chest, the lung on the left side was found swimming in a fluid similar to that contained in the stomach. This fluid was traced to a transverse rupture of the œsophagus, without any trace of ulcer or erosion, and through which the fluid had made its way into the left cavity of the chest.

Induration.—Dr. Baillie is of opinion that induration of the œsophagus seldom or never exists, except as the first stage of cancer of this organ. Some writers, however, state that they have seen the œsophagus surrounded with a cartilaginous ring, and in one case that it was actually converted into bone.

Polypi.—Polypi of the œsophagus are much more rare than of the larynx. Graaëf, Schneider, Pringle, Monro, and others, have all, however, seen this disease.

Schneider says that at the autopsy of a woman, aged fifty-four, and who died of dysphagia, he found three polypous tumors in the œsophagus. These tumors were from an inch to an inch and a half long, and two of them adhered to the mucous membrane by a thin pedicle, while the third was attached by a broad base. In substance they were fleshy, except the pedicles, which were firm and white. The case given by Monro is one of great interest, as the tumor was made out during life, and successfully removed by a ligature. It is as follows:—

James Davison, aged 68 years, was admitted into the hospital for a polypus of the œsophagus. On examining the throat nothing extraordinary was discovered, but on irritating the pharynx till the man vomited, a long fleshy excrescence was thrown up, which filled the mouth and almost reached to the teeth. It had four heads growing from the same stem, and now so pressed upon the larynx that it could not be retained in the mouth longer than a minute without danger of suffocating the patient. For many years it had rendered deglutition difficult, respiration less free, speech less distinct, and produced frequent fits of coughing, by which it was forced upwards into the mouth. In a consultation, it was determined to remove it, first performing tracheotomy in order that the patient might breathe, and then by passing a ligature round the excrescence. This plan entirely succeeded, and a great part of the tumor separated and came away in the stools. Two years afterwards the patient returned to the hospital out of health and emaciated, not having been able for some months to take scarcely any solid or liquid food. He shortly after died, when the œsophagus was found to be distended by a large fleshy polypus, which grew from the anterior surface about three inches below the glottis, single at its base and divided into two heads, of which the largest and longest reached almost to the stomach.

Symptoms.—The symptoms of œsophagitis are almost entirely local, and consist principally of pain, of dysphagia, of the expectoration of a thick viscid mucus, and perhaps vomiting; emaciation follows the loss of nutrition, and the patient ultimately falls from inanition. Dilatation of the œsophagus is marked by nearly the same symptoms. Stricture of this canal may be determined by the introduction of a probang. In ramollissement of this part the patient, except perhaps suffering from indigestion, is generally in tolerable health till the rupture takes place, and then the aliment being effused into the cavity of the chest, he dies from pleuritis or asphyxia. The symptoms of induration without cancerous deposit are not determined. The existence of a polypous tumor can only be determined with certainty when it is high enough to be visible.

Diagnosis.—The diseases with which it may be confounded are similar states of the stomach; and the diagnosis in these cases is often difficult and perplexing. Stricture may be confounded with the spasmodic affections caused by an irritated state of the lung or trachea.

Prognosis.—Simple œsophagitis is probably often recovered from, as is seen after wounds of the throat partially dividing the œsophagus. The chronic forms of inflammation of the œsophagus probably often lay the foundation of the ultimate death of the patient. Ulceration extending into the thoracic cavity is in all cases fatal.

Treatment.—The treatment of œsophagitis is by small local bleedings, by warm cataplasms to the neck, and by moderately acting on the bowels. In the treatment of the more chronic forms some opiate is essential. The use of the probang must be left to the discretion of the practitioner; but it may be remarked, that there are few cases in which it can be really useful, for in dilatation and in stricture of this canal there is an equal danger of rupturing the canal and causing an ulcer. When the case is hopeless from the small quantity of aliment which reaches the stomach, life may yet be prolonged by enemata of broths, milk, egg wine, or other nutritious fluid matters.

OF GASTRITIS.

Gastritis—is an inflammation of the mucous membrane of the stomach.

Remote Cause.—Gastritis is often the consequence of the action of morbid poisons, especially of the typhoid and paludal poisons, or of the poison of the hooping-cough. It is also very constantly the result of many other poisons, as arsenic, corrosive sublimate, or oxalic acid. This disease, however, is extremely rare from the action of general causes, for in the whole of the Peninsular war not more than six cases are reported among the troops, exposed as they were to every species of privation, and in civil life Louis opened 500 bodies without finding a single instance. Indeed, the difficulty of exciting acute inflammation in the stomach will be seen in the long escape of the polyphagist, who swallows knives and watches, and all sorts of heterogeneous things; and of the Indian, who passed many times daily a blunt sword into his stomach with impunity, till at last he pierced its coats and died. The stomach, also, we find, will bear tea or coffee of an almost boiling temperature, followed perhaps shortly afterwards by a quantity of ice. One of the persons resident at the Eddystone light-house at the time it was burnt, swallowed a quantity of molten lead when looking from below upwards to observe the progress of the fire. But even after this intensely hot substance had passed into his stomach, he lived several days. His attendants hardly believed his story possible, but on examining him after death a lump of lead weighing some ounces was taken from the stomach.

Predisposing Causes.—The few cases of simple gastritis that occur have been met with for the most part in adults.

Pathology.—The mucous membrane of the stomach is liable to the diffuse, the adhesive, and the ulcerative inflammations, and these may be either acute or chronic.

The pathognomic characters of acute red diffuse inflammation of the mucous membrane of the stomach are redness, increased thickness, and diminished cohesion, so that much larger portions of it can be removed by the handle of the scalpel than in health. The redness may consist of a few points, or it may be arborescent, or striated, or in patches of greater or less size, or it may occupy the whole surface of the stomach. The colour of the inflamed part is of a deep venous red, approaching to black; and if it be seen or represented of a lighter hue, this result has probably been produced by exposure to the air, which in a few seconds changes the venous tint into a bright scarlet. The seat of the redness is sometimes the villosities, sometimes the web of the membrane, and sometimes also the subjacent cellular tissue, which is often injected, and the seat of extensive ecchymosis. The parts most frequently inflamed are the cardiac or pyloric orifices, the fundus, the convexity of the folds, and sometimes the whole stomach. In chronic red diffuse inflammation there is the same deep venous colour, the same thickening, but the cohesion of the gastric mucous membrane to the subjacent tissue is increased. There is a great tendency also for the deep venous colour, as it subsides, to become changed to a rusty brown, or else to a slate colour.

The adhesive inflammation, or throwing out of lymph at the surface of the mucous membrane of the stomach, is a rare disease. Billard says he has met with it three times in the stomachs of children that have died of thrush; and Andral once saw it in the stomach of a child 12 years old. There is a specimen of this kind to be seen in the museum of St. Thomas's Hospital.

The mucous membrane of the stomach is often the seat of ulcerative inflammation. In some cases the ulcer is a mere erosion, but more commonly it has a distinct edge, generally sharp, as if cut by a punch, and again it may be depressed, shelving off into the muscular coat. In some few instances the edge is elevated and thickened. The *base* of the ulcer is the mucous, the muscular, or the serous coat; and in extreme cases the latter ruptures. It sometimes happens, however, that when the mucous membrane is ulcerated, the serous coat adheres to the surrounding parts, or to the walls of the abdomen; and in the latter case, if the ulceration proceeds, an artificial anus, as it is termed, may be formed, the food escaping externally; or it may adhere to the colon, and the food escape into that canal. Ulceration sometimes takes place from without inwards, as well as from within outwards; thus an abscess of the liver or spleen may burst into the stomach, and an ulcer of the colon has also been known to communicate with that viscus, the fæcal matter passing upwards. The *form* of the ulcer is very various, generally circular or oval, but sometimes linear, or irregular. The *number* is equally uncertain; generally one in chronic gastritis; but in acute gastritis there are often several, and in some cases the stomach is absolutely "*criblée.*" In size they vary from a pin's-head to a sixpence, or to half-a-crown; and in some cases of poisoning from mineral acids, a large portion of the mucous membrane sloughs off. The ulceration in some rare cases has ended in gangrene.

Hypertrophy of the stomach sometimes extends to all its coats, or it may be limited to some one or more of them.

When the mucous membrane is hypertrophied it sometimes appears granulated; at others large patches rise up from half a line to two lines above the general level of the mucous membrane. Instead of affecting all the web of the mucous membrane, the villosities are sometimes alone hypertrophied. The muscular coat also often participates in the disease, and so also may the serous membrane; and when all the coats are affected the thickness of the stomach is often double or treble its usual substance.

Atrophy.—The membranes of the stomach may be collectively or individually atrophied. Atrophy of the mucous membrane may be limited to the villosities, which sometimes entirely disappear. Again, the mucous membrane may be generally atrophied till it is reduced to a third of its usual substance. The muscular tissue may be reduced to a few scattered pale-coloured fibres; while, taking the stomach generally, it may be so atrophied as to be almost without villosities, almost without muscular fibre, and so reduced as to consist only of an attenuated serous and an equally attenuated mucous membrane.

Dilatation of the stomach may be general or partial. Andral gives a case in which the stomach had acquired such an increase of size that it covered the whole mass of intestines, so that its greater curvature touched the os pubis. In stricture of the pylorus the stomach is often so dilated as to reach the umbilicus, and even often exists to this extent when the pylorus is healthy. This augmentation of capacity usually takes place at the expense of the muscular coat, of which only a few fibres can be traced, the great mass of them being replaced by an excess of cellular tissue. Dr. Baillie gives an instance of partial dilatation of the stomach, or of a pouch being formed in which five half-pence had been lodged. The coats of the stomach, he says, were thinner at this part, but were not inflamed or ulcerated.

Contraction.—The stomach is sometimes found so contracted throughout the whole of its extent as not to be larger than a portion of the small intestine. This state of parts is most common in drunkards.

Ramollissement.—We sometimes open patients and find that the slightest traction of the walls of the stomach ruptures them. In these cases the mucous membrane, the muscular coat, the peritoneum, and also the cellular tissue connecting these coats, are softened, and in some cases almost liquified, or transformed into a sort of transparent jelly, and has hence been termed, by Cruveilhier *ramollissement gélatiniforme*. This state may exist with the preservation of the normal colour of each tunic, or they may be paler or redder than usual. The ramollissement may be limited to one tunic, or extend to all. The splenic portion is the part most usually affected; but Andral has observed it over the whole of the surface of the stomach. In one instance the walls of the entire stomach resembled a cherry-red pulp; and the child died with continual vomiting. Another child had vomiting followed by convulsions and coma, and died in five or six days from the commencement of the illness. The stomach in this latter case was reduced to a fine web, and readily tore; but unlike the former case, it was remarkably white, although the course of the disease had been most rapid. In other cases the ramollissement is partial.

Polypi sometimes grow from the mucous membrane of the stomach. Breschet gives the case of a woman, aged 69, in whose stomach there was found a considerable growth of this description. M. Rullier presented to the Académie Royale de Médecine a stomach from which there grew no less than eighty of these excrescences, whose medium size was that of a hazel-nut. Monro gives the case of a lady, aged 45 years, and the mother of several children, in whom was detected, during life, a tumor as big as an orange, on the left side of the navel. Medicine afforded her no relief, and she died emaciated. On examining the body, the tumor was found to be adhering, by its neck, to the villous coat of the stomach. The surface of the tumor was smooth, and the body of it so firm, solid, and tough, that it was cut through with some difficulty. The section of the polypus exhibited an uniform surface. In the museum of St. Thomas's Hospital there is a stomach containing six or eight of these fleshy growths, each about the size of a small nut.

Symptoms.—Acute gastritis, with ulceration, is often seen in cases of fever, and often without any local symptom to mark it. In one case it was accompanied by great anxiety, restlessness, and depression, with great difficulty in swallowing, almost equal to that in hysteria; but there was neither vomiting nor pain, and many authors are of opinion that pain is rarely felt unless an eschar is detached and the subjacent tissues exposed.

Acute idiopathic gastritis is so rare that hardly any writer has ventured to describe the symptoms. When it occurs, however, from poisons, as arsenic, corrosive sublimate, or oxalic acid, the symptoms, though they greatly vary, are generally admitted to be pain of the epigastrium, increased on pressure, with vomiting and purging. The face is pale or red, and the eyes are faded or brilliant and injected, the skin hot or cold, dry or covered with sweat, and the pulse full and strong, or weak and rapid, according to the dose of the poison, and the stage of the disease, and the constitution of the patient.

The course of acute gastritis is generally short, and the patient usually perishes between the first day and the end of a week, and more commonly on the second, third, or fourth day. In cases more prolonged the patient appears recovered after the third or fourth day, suffers no pain, and the vomiting subsides; but this apparent convalescence is often interrupted at the end of two or three weeks by the detaching of the eschar, sometimes followed by hæmorrhage, and which compromises the life of the patient. In other instances the ulcer penetrates deeper, and the patient dies of peritonitis.

In chronic gastritis, even when ulceration exists, the symptoms present an endless series of shades. In general the patient experiences a dull pain in the epigastric region, considerably increased on pressure, and which is worse after eating. This pain sometimes intermits, but more usually is continued. The appetite may be diminished or increased; but digestion is generally difficult and painful, and sometimes followed by vomiting. The mouth is dry, the tongue red or coated, and the bowels irregular. One case is given, in which the suffering of the patient was so trifling that he was dining out, and in the act of singing a jovial song, when the peritoneal coat rupturing, he was instantly seized with most acute pain, and in a few hours died from peritonitis. Dr. Farr gives a case of a hair-dresser in whom the pain occurred only at long intervals, and in severe paroxysms. This man had suffered occasionally from attacks of severe abdominal pain for seven years, but which were always relieved by a glass of brandy. On the day of the fatal attack he had endured the pain almost without interruption, yet continued to attend to his business, and in the evening even went to market to buy fish for his supper. On his return his suffering was intolerable. He took his usual glass of brandy; but this was followed by vomiting. He was anxious to get to bed, but dreaded going up stairs; at length, however, making a desperate effort, he ran up, and fell as he entered the room. Peritonitis was established, and after death an ulcer, with ruptured peritoneal coat, was found in the stomach. In chronic ulcer of the stomach the peritoneal membrane sometimes forms adhesions to the walls of the abdomen, and the ulcer eating through them, an artificial anus, is formed, which has led to many very valuable observations being made *per visum* on the nature of digestion.

Hypertrophy and *atrophy* of the coats of the stomach are perhaps not to be determined during life, except as matters of inference, from the indigestion which usually accompanies them. *Dilatation* of the stomach may perhaps be ascertained by examination, and this is especially to be suspected in the "huge feeder;" its enlargement being perhaps caused like enlargement of the bladder by over distention. It is also found in the melancholic patient. *Contraction* of the stomach is more usually seen in the drunkard, and is the consequence of over excitement from excessive stimulus. Louis states, that in the greater number of his cases of ramollissement the patient has laboured under indigestion, and often for years; but that at the period at which he conceives the ramollissement to have commenced, the loss of appetite was complete, and accompanied by gastralgia, nausea or vomiting, thirst, and some fever. These symptoms he considers to occur with or without exacerbations and remissions, till the death of the patient, which takes place in about six weeks or two months from the time the disease is well marked. Louis is also of opinion that, judging from the symptoms, persons affected with ramollissement do sometimes recover. It will be evident, however, that the symptoms which have been mentioned are common to many other disorders of the stomach, and can hardly be considered as sufficiently diagnostic.

We possess no means of determining the existence of polypi of the stomach, unless the tumor be so large that it can be felt through the abdominal parietes.

Diagnosis.—Gastritis, when accompanied with pain and vomiting, can hardly be confounded with any other disease. When those symptoms are absent, it may be inferred, from the character of the epidemic, but cannot be proved to exist. In general, however, in gastritis the whole alimentary canal is disordered, and the diagnosis between the parts primarily and secondarily affected is extremely difficult.

Prognosis.—A few patients recover from acute gastritis; still the numbers are but few. A few also do recover from chronic gastritis with ulceration. The celebrated Breschet, editor of Bichât's works, was satisfied he had an ulcer of the stomach, and recovered by observing a most rigid diet. He ultimately died of a different disease, and on examining his stomach a cicatrix was found marking the seat of the ulcer.

Treatment.—The mucous membrane of the stomach, like the mucous membranes generally, is little influenced by bleeding, however copious. Still in acute gastritis some blood should be taken, and twenty or such other number of leeches that may be thought necessary should be applied to the epigastrium, and the bleeding afterwards be encouraged by a large linseed poultice, applied to the same part. The rest of the treatment consists in the exhibition of effervescing draughts, calomel, or neutral purging salts, combined with opium or other narcotic, so as to relieve the distressing sickness, and produce some action on the bowels. In the chronic forms of gastritis bleeding is perhaps unnecessary; but the same medicinal treatment should be pursued, though with greater moderation; and as the patient recovers, some bitter or mineral tonic may be substituted for the opiate. The other forms of organic lesion are only to be cured by an entire abandonment of the causes which have produced them; and even then it must be doubtful whether the organ ever recovers its healthy state.

Both in acute and chronic gastritis, the party should be limited to light puddings or slops till the severity of the symptoms has passed, when fish, and then poultry, and afterwards animal food, may be progressively allowed.

Of Enteritis.

Enteritis—is an inflammation of the mucous membrane of the small intestines.

Remote Causes.—The remote causes of enteritis are in many respects the same as those of gastritis, or the greater number of morbid or other poisons. The intestines, however, are much more frequently acted upon by those and every other cause than the stomach. The effects of wet and cold in disordering them are familiar to everybody. They are also more commonly deranged by errors in diet, as by acid fruits or pickles, which often agree with the stomach, but greatly disorder the intestines, and thus lay the foundation of inflammation. Enteritis is likewise produced by many mechanical accidents, as the many forms of hernia, from which the stomach is nearly free.

Predisposing Causes.—Age has much influence in the production of enteritis. The high susceptibility of the bowels in childhood greatly predisposes that period of life to enteritis. In adult age the greater exposure to morbid poisons, and to mechanical accidents, renders this form of disease likewise common to manhood. Old age, though far from being exempt, is not so liable to this affection.

Pathology.—Inflammation of the mucous membrane of the small intestines may take place either in the web of the membrane, or in the follicles, or both. The inflammations of the mucous membrane, taken generally, are the diffuse, the serous, the adhesive, the ulcerative, and the gangrenous, and perhaps all these different inflammations may exist in different parts of the same intestine at the same time. Suppurative inflammation, however, without breach of surface, is unknown in this part of the alimentary canal. The inflammations which have been mentioned may be acute or chronic.

Acute diffuse inflammation of the web of the mucous membrane of the intestinal canal is marked by the same pathological phenomena that we meet with in the stomach, or by redness, thickening, and impaired cohesion. The redness is the same as in gastritis, or a *deep venous red*, approaching to blackness; and this may be either partial or general, dotted or arborescent, striated or in patches. The thickening is generally sensible, and often considerable. The impaired cohesion is not so constant as in the stomach, and in no case can the mucous membrane be removed in such large portions. In the chronic forms of diffuse inflammation, the colour, thickening, and the cohesion, are not greatly dissimilar; but in general the thickness is more considerable, the cohesion of parts, instead of being impaired, is often rendered more tenacious, while the dark venous hue, on subsiding, leaves a greyish or slate-coloured tint, from a deposit of melanic matter in the substance of the membrane.

Serous inflammation of the mucous membrane of the small intestines may be inferred to exist from the large quantities of serous fluid often discharged by stool, during life, at the same time that the abdomen is the seat of pain and tenderness. After death the fact may be proved by the loose diffluent fæcal matter often found in the small intestine; at the same time the mucous membrane is partially or generally inflamed.

Adhesive inflammation of the mucous membrane of the small intestines is an extremely rare occurrence. "I have," says Dr. Baillie, "seen in violent inflammation scattered portions of coagulable lymph thrown out upon the surface of the villous membrane. This, however, is very uncommon" (p. 158). Billard has seen it but twice in the intestines of children. Andral has never seen it. A black man, a gentleman's servant, admitted some years ago into St. Bartholomew's Hospital, presented a striking instance of this disease. The man had been for some short time ill, when he was seized with dropsy, and for this disorder he was sent to the hospital. He died in two or three days, and, on opening him, the lower portion of the ilium for the space of eight or nine inches was covered with a false membrane, forming a perfect cylinder about two lines in thickness, but which did not present the slightest trace of organization.

Ulceration of the mucous membrane of the small intestines is much more common than adhesive inflammation, and is indeed by no means infrequent, especially from the action of the typhoid and the paludal poisons; and this ulceration may take place either at its free or at its adherent surface. When it takes place at the free surface the ulcer, says Andral, may form in the centre of a point of inflammation, the mucous membrane around being healthy, or it may form in the midst of an extended patch of diffuse inflammation without the follicular structure being in any degree affected. Again, the sub-mucous cellular tissue may inflame and become the seat of a number of small abscesses, which may point like so many pock. The apices of these abscesses become thinned and softened, till at length the mucous membrane ruptures, and the pus they contain is poured into the cavity of the intestine. The form, edge, and base of these ulcers are not unlike those found in the stomach, except that the ulcer with a sharp perpendicular edge, as if made by a punch, is much more rarely seen.

Besides *inflammation* and ulceration of the *web* of the membrane, the follicular structure may be either separately or conjointly with the former the seat of inflammation and of ulceration.

The follicular glands of the small intestines are liable to the serous, the adhesive, and the ulcerative inflammations. In serous inflammation the gland is enlarged, transparent, and looks like a drop of pellucid water, having a small black point in the centre, which is the mouth of the duct. When adhesively inflamed, the gland is smaller than in the former instance, opaque, and also much harder, so that they appear like a number of little white granules. The glandular structure also very readily runs into ulcerative inflammation, and when the *plaque de Peyer* is its seat the ulcer generally takes the oval form of the patch. These ulcers have various edges and bases, and sometimes burrow so deep as to rupture the intestine. As this form of disease, however, most principally occurs in typhus, dysentery, and as a consequence of phthisis, the reader is referred to those articles for the more general laws which attend this form of disease.

Inflammation of the intestines, says Dr. Baillie, sometimes, although rarely, advances to mortification. When this is the case the mortified part is of a dark livid colour, has lost its tenacity, and is very readily torn, or as easily as a rotten pear.

Ulceration and mortification sometimes lead to the perforation or rupture of the intestine, when, the contents of the bowel escaping into the cavity of the abdomen, the patient dies of peritonitis. The intestine, however, when ruptured, does not always give rise to peritonitis, for the ulcerated portion may adhere to some neighbouring viscus, as the kidney, liver, or colon; or it may adhere to the walls of the abdomen, and give rise to an artificial anus, so that the fæcal matter is discharged externally through an aperture of the abdomen. In a very few cases the ulceration, and especially when invagination has taken place, is so extensive that a portion of the intestine has been known to be detached and passed by stool. Hevin relates a case in which 28 inches of the small intestine were discharged by stool; and Andral another, in which 30 inches, together with a portion of the mesentery, was passed in the same manner, and yet this patient lived three months afterwards. The explanation of the patient being able to survive this extraordinary pathological result is twofold,—or, that the ends of the intestine, after the diseased portion has sloughed away, are so completely in contact as to unite by the process of adhesion; or else, as Mr. Travers has shown in his experiments on animals, that a layer of lymph is deposited around the peritoneal surface of the diseased portion of the gut, as around a broken bone, and this becoming organized about the time the separated portion is detached, the continuity of the canal remains uninterrupted.

The small intestine, like the stomach, may be *hypertrophied* on one or more of its coats, so that in some instances it has been found of double its natural weight and thickness. It has also been found exceedingly *atrophied*, even when in a state of chronic inflammation and ulceration, so that the membrane has become of extreme tenuity and almost semi-transparent.

Portions of the small intestine have also been found so enormously *dilated*, that Andral has seen the duodenum as large as the pyloric portion of the stomach; while, on the other hand, it is sometimes as remarkably *contracted*. Forten mentions a case of poisoning by nitric acid in which the whole mass of intestines might have been held in the palm of the hand. This contraction, however, may be partial, and be limited perhaps to a single muscular fibre, which has contracted under some high irritation, and become bound down by adhesive inflammation; and in this manner a *stricture* is formed. A young lady died of phthisis and of mesenteric disease, and, on examining her, a stricture was found in the upper portion of the ilium formed in this manner, which so contracted the diameter of the intestine at that part that it hardly exceeded that of a garden pea. A small plum-stone, which it was supposed she must have swallowed a twelvemonth before, was stopped at this point, being too large to pass through the stricture.

The small intestine, like the stomach, is liable to undergo the process of *ramollissement*, and is occasionally ruptured from this cause. A case of ramollissement of the duodenum was met with not long ago, when that intestine tore like a piece of wetted paper. In one instance a *fatty* tumor was found hanging pendulous by a thin pedicle in the small intestine. *Polypi* have also occasionally been found.

Symptoms.—Dr. Baillie says that inflammation of the mucous membrane, or enteritis, among other symptoms, is characterized by acute pain; and Dr. Good says that this pain sometimes "arises to agony." This, however, is erroneous; for the patient, as in fever, is often destroyed by enteritis without having complained of pain. Pain, however, sometimes does exist, or at least is made manifest by pressure; and in this case its more common seat is the ilio-cæcal valve, and the epigastrium, either because those parts are actually the seat of the disease, or else because those parts, like the extremities of a duct, are sympathetically affected. Another symptom in the great majority of cases is diarrhœa, often accompanied by meteorism, and in a very few instances by constipation. The functions of the stomach are in all cases impaired, and occasionally there is vomiting. These symptoms are generally combined with some fever, and a full but not very frequent pulse. The tongue also, if the disease be mild, is white and moist; but if severe, it is brown and dry, and the patient falls into a typhoid state. When the enteritis is the result of the action of a morbid poison, the fever precedes the other symptoms; when it results from any other cause, the febrile affection always succeeds. If the intestine be ruptured into the cavity of the abdomen, and peritonitis follows, the patient is seized with a sudden coldness, a most excruciating pain of the abdomen, and with a most rapid pulse, and in a few hours he lies in a state of irrecoverable collapse; and, except a short respite from pain after pus has been effused, he dies, and apparently from insufferable agony.

The symptoms of chronic enteritis are nearly similar but more moderate,—that is, pain may or may not be present, and in no instance is it of great intensity; the bowels are generally relaxed and the stools sometimes mixed with blood; the patient has little appetite, or nauseates his food; the pulse is little accelerated; and the tongue white and coated, with often a bitter taste in the mouth.

Hypertrophy of the small intestines is not uncommon, especially in dropsy, when they sometimes acquire a double or triple thickness, and apparently an equal excess of weight. The intestines are also as constantly atrophied in phthisis, and their tissues rendered almost transparent; but no particular symptom has been remarked by which these different states can be determined during life; neither can dilatation of the intestine, except when it becomes the seat of meteorism. Stricture of the intestine is more strongly marked, as by frequent attacks of colic or constipation, or of diarrhœa; but even these symptoms, it will be seen, are not strictly diagnostic, as they are common to many other disorders of the intestines. The symptoms of *Ramollissement* of the intestine are extremely obscure, and are only determined to be derangement of the alimentary canal generally, as diarrhœa, indigestion, vomiting, and pains, often severe, but occurring in paroxysms,—symptoms which are common to many other diseases both of the intestines and stomach.

Diagnosis.—The absence of pain, so common in enteritis, renders it at all times difficult to distinguish that disorder from mere deranged function of the intestinal canal. Even in fever the existence of enteritis is often a matter of mere inference, deduced from the nature of the prevailing epidemic.

Prognosis.—Enteritis, when occasioned by fever, or by some mechanical cause, as hernia, is not always a grave disorder. Many, however, fall when it is caused by hernia. In fever, whether the follicular structure be or be not affected, one in six or seven are supposed to recover.

Treatment.—The treatment of enteritis, when not arising from a morbid poison, is by leeches to the abdomen, gentle purgative medicines combined with an opiate, fomentations, and purgative or opiated enemata. After the inflammation has subsided, mild tonics, as salicine, or the tinct. aurantii ex inf. aurantii comp., should be substituted, to recover the lost tone of the parts.

The diet of the patient should be strictly anti-phlogistical, or slops and light puddings.

COLITIS

Is an inflammation of the mucous membrane of the colon.

Remote Cause.—The colon, or large intestine, is acted upon by many morbid poisons, especially by the paludal poison. It is extremely sensible also to cold and wet; is readily deranged by every error in diet; and suffers indeed from all the causes producing inflammation in the superior portions of the alimentary canal.

Predisposing Causes.—Colitis is common to all ages. Children suffer from it during teething; the adult, after exposure to the paludal and typhoid poisons; and old age, perhaps, from the general predisposition there now exists to disease.

Pathology.—The inflammations of the mucous membrane of the colon are similar to those of the small intestines, with the addition, that it readily runs into the adhesive and into the suppurative inflammations. It so readily takes on adhesive inflammation, that large quantities of loose unorganized lymph are often passed, filling sometimes a large chamber-vessel. It also readily runs into suppurative inflammation, large quantities of pure pus being passed, sometimes many ounces, and indeed much more than can be accounted for by the ulcerated state of the intestine, and, consequently, it is highly probable this secretion often takes place without breach of surface. This intestine is also occasionally the seat of simple stricture, or it may be more generally contracted; more commonly, however, it is greatly dilated. It is also occasionally hypertrophied or atrophied, and is occasionally the seat of polypi.

Symptoms.—The *general* symptoms of colitis are not greatly dissimilar to those of enteritis; but the *local* symptoms are more marked, the stools being more frequent, often containing large quantities of mucus, lymph, blood, or pus. The colon, however, being an organ of waste rather than of nutrition, the course of this disease is often much longer than that of enteritis, and the patient preserves a much greater degree of *embonpoint*, and is less frequently affected with fever than in the latter disorder. The derangements of the stomach are also much less marked, so that he preserves some appetite. In other respects, however, the symptoms are nearly the same.

Diagnosis.—In colitis the stools are more frequent, contain more blood than in enteritis, while lymph or pus have hardly any other source than inflammation of the colon.

Prognosis.—The prognosis in all cases in which pus is not present is favourable.

Treatment—does not differ from that recommended in enteritis.

OF INFLAMMATION OF THE LIVER.—HEPATITIS.

Hepatitis is an inflammation of the substance of the liver, and is a disease which has been known from the earliest periods of medicine. The numbers said to have fallen from this affection in England and Wales, in 1839, were 428.

Remote Cause.—The remote causes of hepatitis are very various. The paludal poison is evidently its most frequent cause, and it is probably owing to this circumstance that hepatitis is so common in the East Indies; for in Bengal it forms six per cent., and in Madras 17 per cent.; or, taking the whole mortality of our armies in the East Indies, from this cause, it varies from six to 22 per cent. In this country, where hepatitis arises principally from general causes, and from errors in the quantity or quality of our diet, and more particularly from indulgence in spirits, only one person in about 145 is returned as dying of liver diseases. If, however, we include jaundice, which probably for the most part depends on chronic disease of the liver, and also the many cases of dropsy which often arise from diseased liver, the proportion will be infinitely increased, or perhaps not less than 1 in 8 or 10. The effects of general causes in the production of liver disease is remarkable in animals. Poultry, it is well known, are often "put up" with the intention of producing enlarged livers, and the means used are very various. A room of high temperature is essential, when some entirely deprive them of all food and drink; others of all drink, but cram them; while others feed them on charcoal. These methods not only cause fever and emaciation of the body generally, but also enlargement of the liver: which latter forms the dish, we can hardly call it the delicacy, known as the *pâtés aux grosses foies*. These conditions are nearly those in which the drunkard places himself; the spirits, a highly carbonized fluid, produces heat and fever, loss of appetite, and a thirst so great that ultimately nothing but spirits can quench it. The difference between temperance and intemperance in the production of hepatitis may be seen in the circumstance that 227 per 1000 of the European troops die from this affection in the East Indies, while the proportion among the native troops is only 70 per 1000.

Predisposing Causes.—All ages are liable to hepatitis. Children, if properly dieted, would, in all probability, be nearly exempted; but many of those of the lower orders are early initiated in the use of "a drop," causing a most fatal and unsightly enlargement of the liver. The middle periods of life, however, from a greater indulgence in this pernicious habit, appear most liable to this affection.

Pathology.—In treating of the inflammations of the liver, it is convenient to consider the inflammations first of the ducts and then of the substance of this organ.

The mucous membrane of the gall-bladder and ducts is liable to the diffuse, the adhesive, the suppurative, and the ulcerative inflammations. Thus, if a dog be purged with jalap, the mucous membrane of the gall-bladder is found red and injected; while, if the inflammation, from any cause, be more intense, it is not only red and injected, but also thickened so that a probe can hardly be passed through the swollen lips of the ductus communis or ductus cysticus. As instances of adhesive inflammation, Louis gives eight cases in which the ductus cysticus or ductus communis were obliterated and reduced to a mere fibrous cord; and every museum contains specimens of this kind.

Stahl gives a case in which the gall-bladder contained an ounce of pus unmixed with bile, and Andral has likewise seen pus in the gall-bladder. During the Walcheren expedition the gall-bladder was repeatedly found ulcerated, and Louis has given several other instances. The ulceration sometimes proceeds till the gall-bladder ruptures, and if the bile escapes into the peritoneal cavity the patient dies of peritonitis. Dr. Abercrombie has given a case of a man aged 50, in which the gall-bladder adhered to the walls of the abdomen and ulcerated externally, so that the bile continued to be discharged by this biliary fistula for three years, and sometimes so profusely that in a visit of 15 to 20 minutes, four ounces of bile have been collected. An instance is also given of rupture of the cystic duct at its entrance into the gall-bladder.

The gall-bladder and ducts, besides being inflamed, have often been found hypertrophied, and, in a few instances, atrophied; but they have been more commonly found dilated or contracted. When a calculus has just passed into the duodenum, the ductus communis has been found so enlarged as to admit the middle finger. Again, if that canal has been obstructed by a calculi or other cause, the gall-bladder has been found so enormously distended that, instead of an ounce of bile, its natural contents, it has contained no less than 12 pints.

The gall-bladder and ducts, besides being dilated, have not unfrequently been found greatly contracted. Mr. Twining says that in India the gall-bladder is commonly distended with bile in persons recently arrived in that country, and, as a consequence, inflammation takes place, which, on subsiding, is followed by a considerable contraction or diminution of its capacity. Andral gives a case of adhesion and ulceration outwards of the gall-bladder, and by which means biliary calculi were discharged externally through the walls of the abdomen; but on the party dying, not a trace of the gall-bladder could be found, and in its stead a mass of cellular tissue of considerable density, and in which the ductus cysticus terminated as in a *cul de sac*.

Besides the preceding forms of disease, the gall-bladder has been found *indurated*, and in some very rare instances cartilaginous and bony. Another disease incident to this cavity is hydatids. Simmons gives the case of a woman who had a tumor on the left side of the abdomen, and on examining her it was found to be caused by an immense gall-bladder, which contained 16 measured pints of hydatids. Walter also once met with hydatids in the gall-bladder.

Inflammation of the substance of the liver is not uncommon, and is limited to the diffuse, to the suppurative, and to the ulcerative inflammations. The liver is also known to possess the property of adhesive inflammation by its healing after being wounded; but, as no free lymph has ever been found effused into its tissues, this property, if called into play under ordinary circumstances, must be limited to mere interstitial deposits, causing enlargement or induration of this viscus. These inflammations may be acute or chronic, and the phenomena vary so much according as they occur in healthy or diseased livers, that Gendrin has produced inflammation of the livers of animals artificially in order to determine more particularly its effects in the healthy organ.

Diffuse inflammation of the liver is marked by the liver being greatly gorged with blood, by its being of an unusually deep venous or liver colour, by an evident increase of its size and density, while the finger more readily perforates it than usual. If we now cut into it, the ducts present fewer yellow points than usual, and on opening them we find them inflamed and gorged with bile less viscid than in health. In this state the capsule of the vena portarum, and also the duodenum, are red and injected; the mesenteric veins distended with blood, and the spleen evidently enlarged. If the diffuse inflammation be of a still higher intensity, the affected portion becomes marbled, and bile is no longer contained in the ducts, but in its stead a dark, turbid, bloody serum, while the substance of the liver is so broken down that the slightest pressure reduces it to a mere pulp like a softened spleen, and injections now neither penetrate the ducts, the arteries, nor the veins of the inflamed part. But even in this state the inflammation may terminate by resolution and the patient recover.

The inflammation, however, may proceed, and pus be effused, at first in the centre of the darkest and most disorganized spots, forming a number of different points or foyers which enlarge, unite, and at length form one or more abscesses. The abscess formed, a new process now commences, which is the formation of a lining membrane; but this is rarely perfected in consequence of the abscess rupturing, or of the death of the patient.

Inflammation of the substance of the liver for the most part produces inflammation of the serous membrane which covers it, by which means adhesions take place between the liver and the surrounding parts, and in this direction the abscess usually bursts. Andral has seen this accident take place into the pericardium.

Not unfrequently it takes place into the stomach, duodenum, arch of the colon, or other part of the intestinal canal. It has been known to take place into the vena cava, the infundibulum of the kidney, and in one remarkable case adhesion took place to the diaphragm at a point where the lungs also were adherent, and the ulcer penetrated them, and the matter of the abscess of the liver was coughed up and spat out of the mouth. In other cases no adhesion takes place, and the abscess bursts into the cavity of the abdomen, and the patient dies of peritonitis. It is seldom that the abscess points in more than one direction; but there have been instances in which it has burst not only in one but in two and even three or more points.

The fluid contents of the abscess are in general well-digested pus. Sometimes it is sero-purulent, loaded with flakes of albumen or lymph, and sometimes merely an ill-conditioned sanies. The walls of the abscess are generally unequal, and have the appearance of an ulcer; and Mr. Marshall has in Ceylon seen them in a state of gangrene. It is seldom that more than one abscess exists, but occasionally two or more have been met with. The abscess greatly varies in size, sometimes being hardly bigger than a pea, while in other cases it has contained one, two, and even more pints of pus, so that the larger portion of the liver has been converted into a mere sac. Dr. Chisholm says he has witnessed three-fourths of the liver destroyed in this manner.

The form of abscess that has been described is of the acutest kind, and such as occurs in a perfectly healthy liver. But it sometimes happens that an abscess forms in a white or nutmeg liver, and in these cases scarcely a red vessel is to be seen in the whole substance of the liver, which is sometimes so soft that the blood-vessels have been dissected out by the finger. An abscess having burst, the patient often dies, but he also sometimes recovers. In the latter case the abscess granulates, and the part is repaired as in ordinary abscess; but, as in ordinary abscess, the granulations contract, so that a deep hollow with a central cicatrix marks the seat of this formidable affection.

Besides these acute forms, the liver is liable to many chronic forms of inflammation. It may, for example, be simply *hypertrophied*, acquiring a great size, thrusting up the diaphragm, and extending not only into the pelvis, but also far over to the left side. The increase of weight under these circumstances is often so considerable that the liver has been known to weigh between 30 and 40 lbs. Again, it may be simply atrophied and reduced to one-third of its usual size, or to a mere shapeless lump, and, in these cases, the fleshy fibre is often so changed as to resemble in some degree a muscular structure.

When the liver is hypertrophied or atrophied, it is often also indurated, or else softened. The hard indurated liver is well known, while, in some instances, it is so softened as to be almost a bag of blood.

The other varieties of chronic inflammation of the liver are very numerous; but there is one of them usually termed the " nutmeg," or granular liver, which requires some notice. To explain this form of disease, Andral supposes the liver to be composed of a fleshy substance, and of a cellular tissue, an hypertrophied state of the latter giving rise to the remarkable disease in question. Bouillaud has considered the liver to be composed of a yellow and of a red tissue, while Mr. Kiernan supposes that the difference of colour is the result of mere congestion, and conceives that the nutmeg liver is caused by thickening of the capsule of Glisson, which he has shown accompanies the portal vein, the hepatic arteries, and the biliary ducts, and forms a sheath around them. These hypotheses have been considered by Laënnec and others so unsatisfactory, that many pathologists have considered the peculiar appearance of the " nutmeg liver" to be owing to the deposition of a peculiar heterologue substance, which they have termed scirrhosis. It is evident much further observation is necessary to elucidate this subject; but one remarkable law in this affection is, that the liver is for the most part hypertrophied, and more especially the left lobe.

The substance of the liver is very often loaded or infiltrated with fatty matter, a degeneration termed steatoma, and which is common in phthisis. In this case it usually, but not necessarily, becomes larger than in health, often preserving the impression of the ribs, or of the finger. It is sometimes harder and sometimes softer than in health, is of a cream or pale yellow colour, sometimes resembling a dead leaf, with brownish or deep orange-coloured spots. The presence of fatty matter is determined by an unctuous feel of the liver, by its greasing the knife, and rendering paper smeared with it not only transparent, but also readily combustible, as if dipped in oil. It may also be obtained by boiling. Dr. Bostock compares it to tallow, and Mr. Bird to a soft brownish fat, very fusible, of an unpleasant odour. Vauquelin obtained from a liver of this description 45 parts of a yellow concrescible oil, 19 parts of parenchyma, and 36 parts of serosity. In some few instances, says Andral, the fat, instead of being infiltrated into the substance of the liver, is deposited in masses. This state of the liver, Mr. Bowman conceives, is caused by an unwonted number of granules of fat, of which in health each lobule contains only a few.

The liver is also often the seat of hydatids. These are for the most part contained in cysts, whose dimensions vary from the size of a nut to a large orange, occasionally occupying nearly the whole substance of the liver. The walls of these cysts are usually fibrous, and not to be separated from the liver without tearing that organ. It sometimes happens that the cyst is extremely superficial, and projects beyond the surface of the liver, so that should the disease be chronic, and the patient emaciated, the nature of the complaint can be determined during life. The hydatid cysts may at length rupture, and these animals escape either externally through the abdominal walls, or into the cavity of the peritoneum, or, should adhesions form, may even be thrown up by the mouth. In general, however, the patient falls before this latter addition to his miseries takes place.

Symptoms.—The symptoms of acute hepatitis, it might be supposed, were principally pain and tumefaction of the liver; but the liver is an organ of dull sensibilities, and its most acute and destructive inflammations often take place without any pain being present, certainly not severe pain, unless the peritoneal coat is affected. Thus, according to Mr. Twining, out of 28 cases admitted into the Calcutta Hospital, and which ultimately proved to be liver diseases, only 16 were determined at the time, five being considered to be dysentery, two continued, one intermittent fever, two abdominal inflammation, one chronic diarrhœa, and one debility.

The most prominent symptoms of hepatitis are, however, some tumefaction of the liver, some pain or uneasiness of the liver, or else of the adjoining parts, as the thorax, abdomen, or right shoulder; 2ndly, an affection of the bowels, as diarrhœa or dysentery; and lastly, pyrexia in a continued remittent or intermittent form.

When pain is present, it is found to be in most instances aggravated by lying on the right side, apparently from the greater weight now pressing on the liver, while, in a smaller number of instances, the pain is felt most acutely on turning on the left side, probably from adhesions having formed to the ribs. In general, however, the easiest position is on the back, or else a little over to the left side, and towards the termination of the disease the patient is sometimes observed lying in a position which he had previously declared himself unable to assume.

In a few instances acute hepatitis exists without any pyrexia. Some fever, however, is commonly present, and in general it often commences with shivering, vomiting, and purging—symptoms which gradually diminish in a day or two, leaving the patient comparatively free from fever, and the pulse nearly natural. These paroxysms, however, recur, and at intervals of various duration, sometimes returning as regularly as those of intermittent or of remittent fever, while, in other cases, the periods are less marked, the chief symptoms being rigors occuring at irregular intervals, frequent pulse and sweats, the latter chiefly occuring in the night, and so copious as in some instances to pour off the body of the patient.

The state of the tongue on the admission of the patient is usually furred and loaded, but in the course of a long disease it as usually cleans, or is only slightly foul, till the death of the patient. In some few instances, however, it becomes brown and dry.

The animal functions, as in phthisis, are often marked by the "cheerful hope" which illumines every hour the patient has to live, but in others the depression amounts to despondency, with restlessness and want of sleep. At last, however, delirium obliterates the past, and throws a veil over the future, and with this symptom the patient dies, either with or without jaundice.

In the midst of the symptoms that have been mentioned, perhaps the abscess points; and now the patient becomes hectic, his pulse rapid, and he is covered with a copious and clammy sweat. The life of the patient now in a great measure depends on the part where the abscess points; if it bursts for instance into the peritoneal cavity, the patient assuredly dies of peritonitis; while, if it bursts into the stomach or intestinal canal, or else externally, he often recovers. It is often necessary, when the abscess points externally, from the urgency of the symptoms, to open it; but Mr. Marshall found in Ceylon that in the majority of cases he examined the operation would have been fatal, no sufficient adhesions having taken place to fix the liver to the abdominal walls, and thus prevent the escape of pus into the peritoneal cavity. The abscess having been opened, the patient either sinks, or else re-action takes place; and when the fever thus excited abates, a laudable pus is secreted, the appetite improves, the abscess granulates and cicatrizes, the external wound heals, and the patient recovers.

The different forms of chronic hepatitis are hardly to be distinguished from each other, and are generally denoted by indigestion, irregularity of the bowels, jaundice, and dropsy. An indurated or hypertrophied liver can generally be detected through the integuments, and an examination of the right hypochondrium should never be neglected. Large hydatid cysts can also sometimes be determined during life either from the sensible fluctuation of the tumor, or from the irregularity of its surface.

Diagnosis.—Abscess of the liver is to be distinguished from enlarged gall-bladder or gall-ducts, and from encysted dropsy of the liver; diffuse inflammation of the liver from peritonitis. Chronic hepatitis is to be distinguished from leucorrhœal pains, from cancer, or other organic disease of the stomach.

Prognosis.—Acute hepatitis, occurring in a healthy liver, generally terminates favourably in this country. If, however, it occurs in an unhealthy liver, or as a sequel of dysentery, it is almost uniformly fatal. In the East Indies the mortality among the European troops is 34$\frac{1}{10}$ of those attacked, while of the natives seized only one-tenth fall.

Treatment.—The treatment of hepatitis as it occurs in the East Indies, a disease from which two persons out of three alone recover, cannot be said to be efficient or even well understood, and consequently much difference of opinion must necessarily prevail on this subject, and much opposite experience. The two great experiments which have hitherto been made are bleeding and mercury; and it may be affirmed as a general result, that those means combined are more beneficial and are oftener followed by the recovery of the patient than either of them employed separately. In the young and sthenic European, then, in the East Indies, it is in general necessary to take 15 to 20 ounces of blood, and then to introduce mercury so as to affect the mouth, and as soon as that is accomplished the symptoms rapidly subside. One practical rule, however, is established with respect to the use of mercury in the treatment of hepatitis, which is, that after suppuration *has* taken place, mercury is not only inefficient but injurious. In Europeans, however, whose constitutions have been debilitated from a long residence in the East, bleeding is scarcely applicable, and mercury, from the more or less diseased state of the liver, ceases to produce its original good effects; still, however, it is the best remedy, but should be used with more caution, and many practitioners now limit themselves to pil. hydrarg. gr. v. two or three times a day, giving a draught containing some purgative salt every morning.

If suppuration should take place, the preceding treatment should be at once abandoned, and, if practicable, the abscess should be opened, for there is no chance of the pus being absorbed. As long a time, however, should be allowed to elapse as the patient's state will admit of in order that adhesion may take place. Still, on the slightest indication of the patient's sinking, a trocar should be introduced, for at such a crisis everything must be hazarded. The abscess having burst, either externally or internally, the patient must now be supported with a moderate quantity of wine, by a nutritious diet, and by mild tonics, as the tinct. aurantii, or the sp. ætheris nitrici. The time which elapses after opening an abscess till the patient's recovery is from one to two months.

In Europe, when the hepatitis depends on the action of a paludal poison, mercury so as to affect the mouth, as hydrargyri chloridi gr. v. ter die or bis die, is the most efficient remedy, and under it the patient for the most part recovers. When the hepatitis depends on any other cause, and occurs in a liver otherwise healthy, moderate bleeding is necessary; and the further treatment is a mild opiate, as the tinct. hyoscyami ℳ xv., with some mild neutral salt, as the sulphate of magnesia, or sulphate of soda, ʒ j. 6^{tis} horis. It is remarkable that many cases of hepatitis occur in the foul wards of the London hospitals, while the patients are liberally using mercury; and Baron Larrey states, that in Egypt he has seen hepatitis occur in patients labouring under the influence of mercury. If acute hepatitis should occur in a liver previously diseased, perhaps some mercury is admissible, but such an accident in London is extremely rare, and the practice not determined.

In the treatment of simple hypertrophy of the liver, the most beneficial remedies are the neutral salts, combined with some opiate, preparation of iron, or mild tonic, as the case may require, mercury in these instances being generally injurious rather than beneficial. For the treatment of the nutmeg liver no efficient remedy has been discovered; but in this, as in some of the other forms of chronic hepatitis, mercury, in small doses, but persevered in so as to affect the mouth, often gives the patient great temporary relief, and removes the jaundice or dropsy with which it is accompanied. A combination, however, of mercury and some neutral salt is, in most cases, to be preferred. The old Indian is often benefited by a course of Cheltenham or Leamington waters, without mercury, showing the power which the neutral salts possess over this class of disease. No remedy is known for the fatty liver, nor do we appear to have the power of influencing the formation or stopping the course of hydatids.

Splenitis

Is an inflammation of the substance of the spleen, a disease which is extremely rare in this country, only 27 cases being reported to have died in all England and Wales in 1838, and 29 cases only in 1839.

Remote Cause.—This disease is usually limited to certain districts in this country, as Cambridgeshire, Essex, or other paludal counties. It is common in the East Indies, especially in the low marshy districts of Bengal. It also occurs in the paludal districts of other parts of the world. Now and then it is said to originate from a blow or other accidental violence.

Predisposing Causes.—Splenitis is sometimes seen in children under 10 years of age, and is occasionally met with perhaps up to the age of 50.

Pathology.—The spleen is liable to the diffuse, to the suppurative, and to the ulcerative inflammations. It also possesses the property of adhesive inflammation, for wounds made into its substance have occasionally healed.

The few cases of disease of the spleen occurring in this country will account for its pathology having been little studied. In diffuse inflammation, however, of this viscus, we find it enlarged, of a deep venous colour, and its tissue so softened as to be readily broken down, or even reduced to little more than the consistency of coagulated blood. Diffuse inflammation may terminate by resolution, or it may proceed and pus be effused, and in this case one or more abscesses often containing several ounces of pus have been formed. The abscesses sometimes make their way to the surface, and thus demonstrate the ulcerative inflammation of this organ. Dr. Baillie mentions that the spleen has been found in a state of gangrene.

The spleen is sometimes hypertrophied. In the *Medical Commentaries* an hypertrophied spleen is mentioned which weighed 11 lbs. Portal speaks of another that weighed 30 lbs.; and Lieutaud met with one in a woman who had been ill 17 years, that weighed 32 lbs. It is singular that these large tumefied spleens sometimes subside very rapidly. Abercrombie mentions one that went down a week after the ague on which it depended had been arrested. The hypertrophied spleen is generally more or less indurated.

The spleen is occasionally atrophied so that little more than a rudimentary spleen remains. It is also found indurated and often greatly softened, so that it is imagined this viscus must be liable to the process of *ramollissement*, as well as of inflammation. Hydatids have been found in the spleen. In a few instances, small portions of the spleen, about the size of a nut, are found indurated and nearly white. These appearances are supposed to arise from slight effusions of blood into the substance of the spleen, which become organized, and the colouring particles being absorbed leave the appearances in question.

Symptoms.—Acute inflammation of the spleen is seldom seen unless accompanied by ague; and the additional symptoms are probably tumefaction and some pain of the left side, followed perhaps by dropsy.

In chronic affections even abscesses will sometimes form without any marked local symptoms. Dr. Abercrombie gives the case of a gentleman who was dyspeptic, but took a great deal of nourishment, who was much reduced in strength and flesh, but whose pulse was seldom more than 96 to 100; whose nights were good, though he was occasionally slightly feverish, and who was able till within a few days of his death to drive out in his carriage. This party at length died after suffering for two or three days from diarrhœa, but without any suspicion of the spleen being affected. On examination, however, the spleen was found something enlarged, and in its centre an abscess containing several ounces of pus.

The more common form of diseased spleen is hypertrophy; and in these cases it can almost always be detected by the touch, sometimes extending low down into the pelvic region, well over on the right side of the linea alba, and extending backwards almost to the spine. In these cases the patient complains of weight and uneasiness rather than of soreness; his pulse is natural, but his countenance is extremely sallow, his person greatly emaciated, his bowels irritable, and these symptoms are, for the most part, accompanied by œdema of the lower extremities, or by ascites. The most remarkable part of the history of these cases, however, is, that notwithstanding the sallow and emaciated state of the patient, he is often seized towards the close of the disease with hæmorrhage from the stomach and bowels, often so profuse that many pints have been passed or thrown up, greatly exhausting the patient, and rapidly hastening his dissolution. The cause of this cannot perhaps be well understood, but Mr. Hewson mentions as a curious fact, long known, that blood from the splenic vein does not coagulate, when exposed to the air, like the blood drawn from other veins. The large portion of the blood therefore circulating in these enlarged spleens, being thus rendered incoagulable, may perhaps afford some explanation of this unlooked-for phenomenon.

The course of chronic splenitis is generally long; the patient usually surviving one or more years in the worst cases.

Diagnosis.—Enlarged spleen can only be confounded with encephaloid or other tumor of the abdomen.

Prognosis.—Patients affected with enlarged spleen, and immediately removed from the paludal district, probably recover in a large proportion. If, however, the disease becomes inveterate, the patient dropsical, and the peritoneum thickened, he may recover, but is seldom completely restored, and is liable to all the accidents incident to frequent relapses.

Treatment.—Bleeding in splenitis has not been found greatly to influence the disease, or to effect a cure, while mercury, so beneficial in similar states of the liver, has been found for the most part not only not to be useful but even to be most pernicious. "I feel," says Mr. Twining, "more anxious fairly to show the baneful effects of mercury in the disease now under consideration, because the instructions usually laid down in the best systems of medicine do not inculcate the avoidance of mercury in any case of enlarged spleen, nor do they advert to the pernicious effects of that state of disease which I have termed vascular engorgement." This gentleman, in further proof his position, gives 13 cases in which the patient either died of mortification of the cheek, the nose, the upper lip, or after having lost all his teeth, or a large portion of the jaw, in consequence of the use of mercury, or supposing him to have survived the employment of this medicine, the spleen remained permanently enlarged. Dr. Voigt also, physician to the Danish establishment at Serampore, says that, although most authors recommend mercury, it is an indisputable fact that a very small quantity, even a few grains, generally occasion a profuse salivation, and so violent an affection of the mouth that mortification sets in, the teeth drop out, the bones become carious, and death ensues. In India, consequently, mercury and bleeding are little used, and in their stead a *spleen mixture*, not very dissimilar to that recommended by Celsus, is most in vogue; and the best, according to Mr. Twining, consists of pulv. jalap, pulv. rhei, pulv. Calumba, pulv. zingib, potass. supertart. āā. ʒ j., ferri sulphat. ℈ ſs., tinct. sennæ, ʒ ſs., aqua menthæ pip., ℥ ix. ſs., of which an ounce or an ounce and a half is to be taken twice a day, or such quantity as may produce three or four stools in the 24 hours.

The spleen mixture is, in some instances, greatly efficacious, but in a much larger number of instances, it entirely fails; and under these circumstances the iodide of potassium and the bromide of potash have been recommended. Mr. Twining says he has given the tinct. of iodine in six cases of tumid spleen, and is satisfied it is of no use in that disease. Dr. Williams, however, in his *Elements of Medicine*, states, that in one instance, he has exhibited the iodide of potash in doses of gr. viij. ter die with most complete success. There are cases, therefore, to which it is applicable; but it must be admitted it more commonly fails. The same physician has given four cases of enlarged spleens in which the bromide of potassium was eminently beneficial, and restored the patient, curing his dropsy as well as the enlargement of the spleen. As no other remedy is at present even suggested for the cure of this intractable disease, the bromide of potash well deserves a further trial. The dose is gr. v. to x. ter die, out of camphor mixture.

Nephritis

Is an inflammation of the kidneys. This disease, in an acute form, is extremely rare; for in the returns of the causes of death for England and Wales in 1838, only 157 cases, and in 1839, only 139 cases of nephritis are mentioned as having proved fatal in those years. Chronic affections of the kidney, however, are extremely common; and taking dropsy as very generally connected with diseased kidney, it is quite plain that the deaths from simple organic affections of these glands amount not only to an infinitely larger number than has been mentioned, but form a considerable portion of the general mortality.

Remote Causes.—The kidney is acted upon by some morbid poisons, as the small-pox, but they are few in number, and rarely produce extensive mischief. A great number of substances, however, as alcohol, cantharides, turpentine, rhubarb, neutral salts, &c., are carried to the kidneys, and consequently must produce abnormal action, and sometimes disease of these organs. There is likewise hardly any disorder incident to the human frame which does not modify the urine, and consequently affects the kidney. Every atmospheric change or alteration of temperature affects the secretion of the skin, and consequently of the kidney. Most moral affections also, as hysteria, grief, or other depressing feeling, produce a similar effect. Many local diseases likewise, as diseased states of the bladder, urethra, or the presence of calculi, are equally remote causes of nephritis.

Predisposing Causes.—Children, except they labour under calculi, are rarely subject to nephritis. These affections are consequently most commonly met with in the adult, and in these after the age of 30.

Pathology.—The substance of the kidney is liable to the diffuse, to the suppurative, and to the ulcerative inflammations.

The previously healthy kidney, when diffusely inflamed, is loaded with dark venous blood, is softer than natural, and is considerably enlarged. Externally its surface is dotted with a number of dark red points, often surrounded with a vascular net-work, while internally the cortical substance is more loaded than the medullary, and is also dotted with dark points, which Rayer supposes to be the Malpighian bodies injected. The mucous membrane of the pelvis of the kidney is also red and injected.

The diffuse inflammation may terminate by resolution, when it leaves the kidney probably harder than usual; but it may proceed, and suppuration take place, which, according to Rayer, is most frequent in the cortical substance. The pus effused may form one or more abscesses, which vary in size from a pin's head to a large cyst, formed by the entire destruction of the kidney. Rayer has given some drawings which he conceives to represent purulent infiltration of the substance of the kidney.

Besides the substance of the kidney being inflamed, the mucous membrane lining the pelvis and tubuli is also often the seat of the diffuse, the adhesive, the suppurative, and the ulcerative inflammations, and these inflammations have received the name of *pyelitis*, from πυελος, pelvis.

Diffuse inflammation of the mucous membrane of the kidneys is marked by redness more or less general, and of a deep venous colour of those tissues, and this redness is sometimes increased by small patches of ecchymosis. This inflammation may terminate by resolution, or it may proceed; and Rayer has given two plates in which lymph has been thrown out at its free surface. In other cases pus is secreted, and in acute pyelitis, says the same authority, we can sometimes determine the presence of pus, either by the eye or by the assistance of the microscope, in the urine contained within the pelvis. Ulceration is a possible condition of pyelitis, but is seldom met with in the acute forms of this affection.

In the chronic forms of diffuse inflammation of the mucous membrane of the pelvis, the appearances are for the most part similar to those of the acute forms, but the mucous membrane both of the pelvis and calices is more sensibly thickened, so that those canals are sometimes transformed into fibrous cords. If pus be effused and retained, the calices and pelvis often become enormously dilated, while the substance of the kidney is atrophied. Rayer has given instances of chronic abscesses of the kidney so large, that they have communicated with the liver, or ruptured into the duodenum, or have adhered to the diaphragm, and burst into the bronchi. He has also seen them extending downwards to the cæcum, or even to the crural arch; likewise opening in the back, and discharging urine and pus through a lumbar fistula, and these latter are instances of ulceration of the substance of the kidneys.

It will be seen also, from the above instances, that the mucous membrane of the kidneys is liable to ulceration, especially if the kidney be the seat of a calculus; and that these ulcers sometimes heal, is manifest from our occasionally meeting with cicatrices.

Rayer mentions having seen in acute as well as in chronic pyelitis the pelvic membrane covered with an eruption of transparent vesicles, like sudamina. Andral has likewise seen a vegetation, red and soft, with a broad base, of the size of a small nut, growing from the same tissue.

On examining persons who have died of pyelitis, or extensive abscess of the kidney, we often find sand, gravel, or a calculus, which has laid the foundation of the disease, contained either in the pelvis or calices. When calculi form, they are sometimes small, sometimes of great size, and sometimes composed of many small ones agglomerated together. Their form is extremely irregular, generally taking that of the dilated pelvis and calices in which they are retained, and from this cause are often knobbled, or branch out like a piece of ginger.

The kidneys are sometimes notably *hypertrophied*, still retaining their form, structure, and appearance. This hypertrophy may take place in one or both kidneys, and in every case in which one kidney is either atrophied or wanting, the remaining one is as a general law hypertrophied, and has often weighed eight or nine ounces, or more than two healthy kidneys. Hypertrophy of the kidneys often accompanies diabetes.

The kidneys are likewise sometimes *atrophied;* and this affection may be general, or limited to the cortical or to the medullary substance. Bartholin has seen them no bigger than a chestnut. Morgagni has likewise mentioned several cases of atrophy of the kidneys, and in one the kidney had scarcely the size of the surrenal capsule; and Rayer mentions a case in which the right kidney had not one-eighth part of its ordinary volume, although the calibre of its renal artery was nearly equal to that of the left kidney, which was of the ordinary size. The most remarkable partial atrophy of the kidney is the disappearance of large portions of its tubular structure, so that in some instances hardly a trace of it is left, a circumstance extremely frequent.

The pelvis and calices of the kidney are sometimes greatly dilated, without the slightest trace of inflammation. This state of the kidney is usually caused when an obstacle occurs to the passage of the urine, either in the urethra, bladder, or at the mouth of the pelvis itself. This state has been termed dropsy of the kidney or hydro-renal distension. At first the distension is trifling, but if it proceeds, a pyriform tumor forms in the fissure of the kidney, whose apex is downwards. Rayer has given a plate of one of monstrous dimensions; and Tulpius speaks of having seen one as big as the urinary bladder; Frank of one that filled the abdomen, and weighed 60 lbs. In Rayer's case, the kidneys were so compressed as to be no larger than a haricot bean.

Besides dropsy of the kidney, *serous cysts* very often form in the substance of the kidney. These cysts are almost always filled with a serous fluid, which, analyzed, gives albumen and the usual salts of the blood. These most commonly form in the cortical substance, are lined with a serous membrane, and vary in number from one to three or four, or even a greater number. In size also they vary from a pea to a goose's egg. These cysts also sometimes form in the surrounding cellular tissue, and sometimes with great rapidity. Mr. Cæsar Hawkins gives the case of a child run over at the end of September, and, on the 1st of December, a cyst had formed, which was punctured through the abdominal muscles, when 18 ounces of fluid were drawn off. The cyst filled again, and the child died on the 25th of December.

In a few instances cyst is contained within cyst; but this form is generally supposed to denote the presence of *hydatids* in the kidney.

The most frequent as well as the most remarkable of the diseases of the kidney, is that which is termed the *granular* or *Bright's kidney.* The disease known under this name has many varieties, and these varieties have been considered by some authors as so many distinct diseases, while others esteem them to be only so many different stages of the same disease. These Dr. Bright divides into three, Martin Solon into five, and Rayer into no fewer than six stages.

Those who contend for this difference of stages affirm that, in the first stage the kidneys are unusually large, flabby, loaded with dark venous blood, and hardly in any respect differ from what is observed in diffuse inflammation, except that externally the kidney has a granular appearance, caused by the deposition of a dark reddish yellow matter.

The second supposed stage is marked by the granular matter penetrating still deeper into the cortical substance, and which gradually increases till it invades the whole of the medullary substance of the kidney. This granular substance is of a greyish-red, or greyish-yellow colour, and has in many cases something of a *cheese*-like appearance. The kidney is now sometimes larger than natural, sometimes of the natural size, and sometimes, though rarely, diminished. Its consistency also varies, for if enlarged it is commonly softer than the healthy kidney, but if diminished it is for the most part firmer. Its colour, viewed externally, is sometimes a pale tint of the natural hue, but more commonly it is of a greyish-yellow or yellowish-red, and *mottled.* Its surface is also strongly granulated, and even rough. In this state, if the kidney be now injected, the matter of the injection does not, according to Dr. Bright, penetrate the cortical portion.

The last stage is marked by the morbid granular deposit, besides invading the medullary substance, attacking the tubular portions of the kidney, so that the tubuli are often to a very considerable extent obliterated, and perhaps, with the exception of a single pencil of that structure, is entirely converted into one homogeneous degeneration. The kidneys are now, in some instances, of their natural size, but more generally they have contracted, and are smaller than usual; their surface is also now lobulated, pale, and granular, resembling the roe of a salmon. Their consistency also is sometimes softer and sometimes harder than natural; and Dr. Bright speaks of some instances in which they cut like cartilage.

Another disease of the kidney is Induration of its substance; and this alteration of its structure is consistent with its being enlarged or diminished in size, but more commonly the latter. Its colour also may be either natural or else darker or paler than usual. The induration may be partial or general, and when partial its most common seat is the tubuli, which often acquire an almost cartilaginous hardness.

The kidney is sometimes found softened, or in a state of *ramollissement;* and this alteration of the kidney, according as the organ is healthy or unhealthy, may be either pale or of an intensely deep red or liver colour.

Andral says, "I have found the substance of the kidney, whether pale or yellow, grease the scalpel." It is by no means unusual, however, to find steatoma of the kidney, and considerable portions of its substance either invaded by or else converted into fat.

Periphrenitis is an inflammation of the adipose, fibrous, and cellular tissue surrounding the kidneys. These parts are sometimes found simply injected, sometimes the seat of abscess, and sometimes gangrened. A remarkable case is narrated by Dr. Turner, in the *Transact. of the College of Physicians*, which destroyed a lady near 30, and yet, strange to say, she neither experienced any pain or difficulty in making water, neither was she aware of her urine being less copious than usual.

Symptoms.—Acute nephritis is an extremely rare disease, so that there is much doubt whether we are thoroughly possessed of its symptoms. Those mentioned by Dr. Baillie are as follows; but it will be seen that they are almost identically the same as those observed in the passage of a calculus, which makes it doubtful whether that eminent physician ever saw the disease. "When the kidneys," he says, "are inflamed, more or less pain is felt in the region of these glands, and the pain commonly shoots along the ureters. There is a sense of numbness down the thigh, and in the male there is often retractation of the testicle, or a feeling of pain in it. When one kidney is affected these symptoms are only felt on that side. The urine is voided frequently, and is sometimes of a pale, but more commonly of a deep red colour. The stomach sympathizes with this state of the kidneys, for it is affected with sickness and vomiting. The bowels are at the same time often costive, and subject to colicky pains. These symptoms are accompanied by more or less fever." "When pus is formed it may be known by its being mixed with the urine." Mr. Stanley's cases by no means bear out this description. He gives the case of a man who had retention of urine in consequence of a gonorrhœal discharge being stopped by injections. In this instance the kidneys were found extremely vascular and soft, with numerous minute depositions of pus throughout the corticular and tubular parts, and the infundibula and the pelves were likewise filled with pus. The principal symptom was severe pain at the fifth lumbar vertebra. In another similar case, but not quite so acute, the kidneys were found so dark-coloured as to be almost black, and at the same time remarkably flaccid. This patient died paraplegic, the loss of motion being complete, and that of sensation nearly so.

If nephritis passes to a chronic suppurative state, the pain in the loins is often severe, the appetite impaired, while pus is found, and often to a considerable amount, in the urine; and if a calculus or gravel be the immediate cause, the urine often contains large portions of those substances mixed with blood.

The other forms of chronic disease of the kidney have not as yet been distinguished from each other. For the most part they present no local symptoms, but give rise to dropsies, having no specific differences. The granular kidney, however, is always accompanied by albuminous urine, by universal anasarca, an impoverished state of the blood, and the many other singular phenomena of that disorder. It must be remembered, however, that although granular kidney is constantly acccompanied by albuminous urine, yet albuminous urine may accompany every structural disease of the kidney, or result from a mere disease of function.

Diagnosis.—Diseases of the kidney are to be distinguished from those of the bladder by the presence of dropsy, and also by the fact that the bladder is infinitely less liable to be the primary seat of disease than the kidney.

Prognosis.—Acute affections of the kidney are in all cases of grave prognosis. The chronic forms of these affections are perhaps consistent with life, but in every case they greatly impair it, and are ultimately the cause of premature death. When dropsy is established the patient recovers with difficulty, and is then liable to relapse.

Treatment.—The treatment of acute nephritis must be according to the ordinary laws of inflammation, or by bleeding, evacuants, and opiates. The young practitioner, however, should be warned that blisters in these cases are dangerous, and should be avoided. The neutral salts, with opiates, are perhaps admissible; but most writers recommend castor oil, manna, or other purgative substances which do not act so immediately on the kidneys. In chronic suppuration of the kidney it is plain that bleeding must be omitted. The other forms of diseased kidney, if they are ever cured, yield to the treatment pointed out for the cure of the dropsies which depend on them.

Of Ureteritis and of Cystitis.

Ureteritis and Cystitis are inflammation of the ureter and of the bladder; but being parts so intimately connected and so rarely affected, it is thought best to unite them together. 138 cases are said to have died of these diseases in 1839.

Remote Causes.—The bladder or ureter is rarely acted upon by morbid poisons; and Louis has shown that ureteritis and cystitis rarely co-exist with diseases of other parts; for out of 500 persons dead of other diseases than those of the urinary organs, there were only five or six in which the mucous membrane of the bladder was injected, and only one in which a small ulcer of the same part was found; a remarkable circumstance, considering how frequently retention of urine is a symptom at the close of many diseases. It is well known, however, that cantharides, turpentine, and perhaps some other substances, act specifically on the bladder, and produce inflammation. Calculi, together with diseases of the kidney, are the most frequent causes of this affection.

Predisposing Causes.—The parties who suffer from these affections are principally adults and children who labour under calculi.

Pathology.—The mucous membrane of the ureter is liable to the diffuse, to the adhesive, to the ulcerative, and to the suppurative inflammations, and these may be acute or chronic.

The ureter is occasionally found to be highly vascular, and of a deep venous colour after the passage of a calculus; and this is supposed to prove that the mucous membrane of this canal is liable to diffuse inflammation. There are repeated instances of adhesive inflammation of this canal. Andral quotes a case in which all the internal surface of the ureter was covered with a layer of lymph similar to the membrane in croup; and in some rare instances the ureter has been found obliterated or transformed into a fibrous cord. A transverse canal has also in some instances been found connecting the two ureters; but whether this is a congenital formation or a consequence of a temporary obstruction of the ureter, is problematical. There are other well-marked effects of adhesive inflammation of the ureter, as when the delicate coats of this canal are increased, as in cases of severe chronic disease, to 4 to 6 lines in thickness. Suppurative inflammation also sometimes takes place in the ureter, and without breach of surface; for, in a case in which a calculus was found in the ureter, Cruveilhier says the part above the obstacle was filled with blood, *pus*, urine, and gravel. The different inflammations that have been mentioned sometimes terminate in ulceration, and the ulcers in some cases heal, for cicatrization of the mucous membrane has been met with. In other instances the ulcerated part has ruptured, and the patient has died in consequence of effusion of urine into the surrounding parts.

The ureter is occasionally much hypertrophied, especially if the bladder be diseased. It is also often greatly dilated, especially when a calculus is retained, or else when the bladder is so distended from the retention of urine as to obliterate the valvular fold which in health prevents the return of the urine towards the kidney. In these cases it is often so enormously dilated as to equal the size of a child's arm, and sometimes, according to Rayer, till it ruptures, the walls being from their great distension in a state of atrophy. In chronic inflammation the walls are often greatly thickened and *indurated.* No case is known of *ramollissement* of this canal.

The mucous membrane of the bladder is likewise liable to the diffuse, the serous, the adhesive, the suppurative, and the ulcerative inflammations, and these may be either acute or chronic. These inflammations may extend over its whole cavity, or be limited to some portion of it, and the part most frequently inflamed is that near and around the neck of the bladder. In this it follows the law of all hollow organs, or that it is most liable to be diseased at its orifices. There is also another reason for this part being more frequently attacked than the rest, or the occasional extension of inflammation of the urethra to this part.

"It is well known," says Dr. Baillie, that "the inner membrane of the bladder in the dead body hardly shows any vessels which are large enough to carry red blood in its natural state;" but when *diffusely* inflamed, it is crowded with a prodigious number of extremely fine blood-vessels, and among them may be seen small spots of extravasated blood. This state has many degrees, and the colour is usually of a venous red, while, in addition to this, the coats of the bladder generally are thickened. It may terminate by resolution, or it may pass into serous inflammation, or catarrh of the bladder. The mucus secreted in this latter disease is at first small in quantity and extremely fluid, but is deposited as the urine cools. At a further stage of the disease it becomes abundant and thickens, equalling or surpassing the urine in quantity, and which now resembles thick gruel, and is often mixed with blood, or gravel, or both. Andral has twice seen the internal surface of the bladder coated with lymph more than a line in thickness, and similar to the false membrane of croup. The lymph thus effused sometimes becomes organized; and in this manner calculi have become encysted and removed out of the reach of the sound. Dr. Baillie tells us that Dr. Ash met with a case in which the urinary bladder was divided (probably from this cause) into two chambers, which communicated by a small aperture with each other. The upper chamber was usually much distended with urine, so that a round tumor could easily be distinguished by the touch above the pubes.

Inflammation of the mucous membrane of the bladder often terminates in suppuration, and pus to a considerable amount may then be passed. Occasionally, instead of suppuration taking place at its free surface, an abscess forms: in either case ulceration may take place, sometimes superficially, and sometimes so burrowing as to perforate the bladder, and form a communication between it and the neighbouring parts, as the cavity of the abdomen, the rectum, or the vagina. When the communication is formed with the general cavity of the abdomen, the urine escapes into it and produces general peritoneal inflammation.

The mucous membrane of the bladder is liable to similar chronic inflammation, sometimes retaining its normal colour, and at other times being grey or *ardoisée*, brown, or black; and it has often acquired a double or even triple thickness. The follicles also, which are hardly visible in health, are now enlarged, and extremely palpable to sight. One of the most ordinary changes, however, in the bladder from its natural structure is hypertrophy of its muscular coat. In a natural state the muscular coat of the bladder, when it is moderately distended, consists of thin layers of muscular fibres running in different directions, and probably less than the eighth of an inch in thickness. The muscular coat of the bladder, however, is found in some cases half an inch thick, owing, for the most part, to its efforts to overcome some resistance, as an enlargement of the prostate, or the presence of a calculus or a stricture in the urethra to the passage of the urine. In some instances these efforts of the bladder to evacuate its contents have led to the mucous membrane being protruded through the intermuscular spaces, forming a pouch or hernial sac, in which a small calculus has been embedded, but this form of disease is extremely rare. The mucous coat of the bladder is also often greatly hypertrophied.

The bladder may also be atrophied, so that when distended it is semi-transparent, and this may result from an atrophy of all its coats, or from a faulty development of the muscular coat. In some cases of congenital malformation the anterior portion of the bladder is wanting, and this is generally coincident with a defective state of the muscles of the abdomen, which are imperfectly united to the pubis. The bladder has also in some instances been altogether wanting.

The bladder is sometimes much *indurated* from chronic inflammation, while in other cases it has been found to have undergone the process of *ramollissement*, similar to that incidental to the stomach, when the slightest traction is sufficient to cause a rupture, and sometimes give rise during life to spontaneous perforation.

Dr. Baillie mentions having seen one case of *polypus* of the bladder so large as to fill up the greater part of its cavity. It was very irregular in shape, consisting of various projecting masses, but seemed pretty firm in its texture. Some of these tumors, says Andral, are hard and void of every trace of a vessel, while others are soft and vascular, and others again seem mere prolongations of the mucous membrane.

The bladder is sometimes enormously *dilated*, so as to occupy the lower part of the cavity of the abdomen, and to contain several quarts. It is in other cases so contracted as hardly to have any cavity, and will scarcely hold a few tea-spoonfuls.

Symptoms.—The symptoms of inflammation and of the other diseases of the ureter are probably the same as those of the similar diseases of the bladder, except, perhaps, that the pain is more strictly lumbar; and when these canals are greatly enlarged, it is possible they may be felt through the walls of the abdomen.

The symptoms of inflammation of the bladder are pain felt in the perinæum and above the pubes, accompanied with a fulness or swelling, also frequent attempts to make water, which is evacuated in small quantities and with great pain, or there is a total retention of urine, with a strong desire to void it. The rectum is affected, from its connexion with the bladder, with tenesmus, and the stomach likewise takes part in this disease, being affected with nausea or vomiting. In some cases these symptoms are accompaned with much constitutional irritation and by delirium. When pus is formed, it will be seen mixed in the urine evacuated. The slighter form of the disease, or cystirrhœa, is characterized by milder symptoms, which consist principally of local pain and irritation, and by the urine being loaded with mucus, which sinks to the bottom of the vase, mixed with a large quantity of sandy precipitates either of the phosphates, of the urates, or of both. It is remarkable that on this form of disease subsiding, that the patient often falls from disease of the lungs. The symptoms of the other forms of disease of this viscus vary only in degree from those which have been mentioned.

Diagnosis.—When the kidneys and ureters are diseased the bladder very constantly sympathizes with those diseases; and the affections of the bladder being much more painful than those of the ureters and pelvis of the kidneys, the sympathetic affection of the bladder is often mistaken for the primary disease. Morgagni first pointed out this fact, and gives a case in which, from these sympathetic pains, it was believed that the patient laboured under disease of the bladder; yet after death the bladder was found perfectly healthy, while the kidneys were extensively diseased, and filled with large calculi. Lowdell and also Howship give similar instances of the kidneys being diseased, when the symptoms of the bladder were so prominent as to be mistaken for the primary disease.

Prognosis.—The result of the acute forms of inflammation of the bladder or ureter is generally favourable. The chronic forms of cystitis, as of cystirrhœa, are more formidable, and often ultimately cause the death of the patient.

Treatment.—Bleeding does not greatly influence inflammatory affections of the bladder; but some authorities nevertheless direct moderate bleeding and purging, together with opiates, diluents, and the warm bath, as the best means of curing the very few acute affections of this viscus that we meet with. Chronic inflammation of the bladder, and especially cystirrhœa, is of very difficult cure, and often our best-directed efforts are unsuccessful. The state of the urine is perhaps one of the surest guides in our attempts to cure the patient; and if the urine be acid, the best medicines are the neutral salts or the pure alkalies, with opiates; while, if the urine be alkaline, or greatly loaded with mucus, the mineral acids are of the most service, combined with an opiate. Thus the infusi rosæ c. acidi sulph. dilut. ♏ij. to ♏v. c. magnesiæ sulphatis ʒj. c. tinct. opii ♏iij. to ♏v. 6^{tis} horis is one of our best and most useful remedies.

The remedies which have been mentioned, though highly useful, yet frequently fail, and, in such cases, tonics often succeed, and of these salicine is the best, and gr. x. ter die vel 6^{tis} horis may be given with great chances of success. It must be admitted, however, that much difference of opinion prevails as to the best tonic remedy, some preferring uva ursi, others pariera, others the turpentines, as the Canadian balsam, and others again the inf. diosmæ.

Of Peritonitis.

Peritonitis is an inflammation of the serous membrane lining the abdomen, and covering the viscera contained in its cavity.

This disease was known to the ancients. It is not common; and if we take the numbers reported to have died of this disease, of hernia, and also of intussusception, the deaths from the two latter being generally caused by peritonitis, we find they amounted to only 757 cases in 1838, and to 895 cases in 1839, in England and Wales, which gives one death in about 370.

Remote Causes.—Inflammation of the peritoneum is caused by a few morbid poisons, as the paludal poison, and the poison of scarlet fever. Mechanical violence, as the kick of a horse, also the operation for hernia or the stone, or that of paracentesis, are frequent causes. Rupture of the intestine from ulceration, or the bursting of an abscess, or of an aneurismal tumor into this cavity, is also another class of causes. Errors of diet, and especially frequent intoxication, is an occasional cause, the disease termed *gin-colic* being a chronic inflammation of the peritoneum. Sudden and great changes of temperature are also causes, especially in women at the period of menstruation. Intussusception of the intestine, or strangulation of the intestine from hernia, or other accident, are also occasional causes. As a secondary disease it is frequently produced by hepatitis, splenitis, enteritis, and by cancerous and tubercular deposits in the subcellular tissue.

Predisposing Causes. — Children sometimes die of this affection after scarlatina, and also from strangulation of the intestines in consequence of congenital malformations. Peritonitis, however, is most common between the ages of 20 and 40. Women appear to die more frequently from it than men; and in 1838 the proportion was 57 men to 117 women, while in 1839 the ratio was 68 men to 115 women, or nearly in the ratio of two to one. This greater liability to peritonitis in the female sex arises perhaps from the great sympathy between the uterus and the peritoneum, a sympathy which is strongly marked, not only at the period of menstruation, but also at the time of parturition. At the latter period, in the opinion of many excellent practitioners, the remarkable fact occurs of puerperal peritonitis becoming contagious, and that the contagion spreads among puerperal women only.

Pathology.—The peritoneum is liable to the diffuse, the serous, the adhesive, the suppurative, the ulcerative, and to the gangrenous inflammations, and these may be either acute or chronic.

Acute inflammation of the peritoneum, as of all serous membranes, begins in the connecting cellular tissue, which becomes red and injected, and at length the same phenomena pervade the serous membrane itself. The colour of this membrane, when inflamed, like that of all serous membranes, is a bright arterial scarlet hue; the membrane being first dotted with a number of small red points, which become confluent, and form streaks and patches which in their turn coalesce; or a small central nucleus of inflammation may form and spread till the whole extent of the peritoneum is one entire bright scarlet. In addition to the redness, some interstitial deposit accompanies diffuse inflammation of the peritoneum, so that this membrane loses its transparency, and is thickened. The consistency also of the subcellular tissue is greatly impaired, and rendered easily lacerable, so that the peritoneum is now capable of being detached in considerable portions. This inflammation may terminate by resolution, or it may proceed, and serum be poured out, when serous inflammation is established. The quantity of serum effused may be trifling, not exceeding a few ounces, but occasionally it is large, fills the cavity of the abdomen, and constitutes inflammatory dropsy.

The next degree of peritonitis is the adhesive inflammation, when lymph may be thrown out oftentimes so loose as to float unattached in the serum, or it may be of such consistency as to unite opposite parts together, and of such extent as sometimes to form an adventitious membrane, covering the entire of the abdominal walls as well as the whole of the intestines. The period at which organization of the lymph thus effused begins has been determined by Mr. Hunter to be in about 24 hours. If the disease proceeds, pus is effused, sometimes not to a greater amount than a few ounces, but in other cases it amounts to many pints, or even fills the whole of the abdominal cavity. Ulceration of the peritoneum is infrequent, and generally takes place from without inwards, as from a perforating ulcer of the small or large intestines or from the rupturing of an abscess or other tumor. The peritoneum is also liable to mortification, either from high inflammatory action, or else from strangulation, as in hernia. In this case the part is of a reddish-purple or black, and is easily torn. The different acute inflammations described have been mentioned as though succeeding each other; but in many instances all these different forms co-exist in different parts of the peritoneum at the same time, and perhaps have been irregularly set up.

The chronic forms of peritonitis may be *chromatous* or *achromatous*, and the latter present some of the most curious phenomena incident to this tissue. The peritoneum, for instance, is often found to be white, opaque, and thickened, the subcellular tissue having become almost incorporated with the membrane, so that together they sometimes form a substance an eighth of an inch in thickness. The tissues are also now indurated, and much less easily detached; and, taking all these circumstances together, they show that the peritoneum must have been the seat in all probability of a chronic achromatous inflammation. A similar achromatous state of parts is often seen when serum is thrown out; and also when the intestines are found glued to each other and to the cavity of the abdomen by adhesive inflammation. It is remarkable, also, that pus in sufficient quantity to fill the abdomen is sometimes likewise found effused without the peritoneum being discoloured. It is from this process, also, that we occasionally find large cysts attached to the liver, or other abdominal viscus, filled with serous fluid.

The peritoneum is sometimes the seat of chronic *chromatous* inflammation. Thus we sometimes meet with chronic red diffuse inflammation, with chronic red serous inflammation, and with chronic red adhesive inflammation. The latter may be of various extent, and sometimes is so considerable that the false membrane which is formed covers not only the walls of the abdomen and of the viscera, but also the whole of the intestines, and even slips down between the convolutions. It is of a muddy brown or rusty colour, and usually contains much melanic matter, both in the web and at its free surface, and also much tubercular matter in the sub-cellular tissue. The membrane thus formed, like all new adventitious parts, readily runs into disease, and from this cause we often find the abdomen filled in these cases with serum or pus. In these chronic forms of chromatous peritonitis the subcellular tissue is less lacerable than in health, and Louis also mentions that parts which have been the seat of chronic peritonitis have a strong tendency to contract. Thus he has found the omentum corrugated, contracted, and folded up under the greater curvature of the stomach, till it has been so reduced as to be hardly recognizable and merely rudimentary. Besides the omentum, he has found the mesentery also contracted, that membrane being more or less shortened, till the intestines have been drawn up to the spine, and with such force, that an existing hernia has been sometimes completely reduced. The intestines themselves are also often contracted, and more frequently perhaps in their length than in their calibre, and in extreme cases they have been found to lose half or nearly so of their dimensions, when the valvulæ conniventes have been consequently drawn close to each other.

Experience has also shown that, although the structure of the peritoneum appears to be uniformly the same, yet certain parts of it are more liable to inflammation than others, as the convex surface of the liver or spleen, the right iliac fossa, the surface of the small intestine, and in females the broad ligaments, the Fallopian tubes, and the parts immediately adjoining them, as also the space covering the rectum and bladder. The parts the most rarely affected are those covering the stomach, bladder, the omentum, and the mesentery. It will be seen that the liability of different parts of the peritoneum to inflammation is in proportion to the liability of the organs they cover to become diseased, and that these partial inflammations are for the most part the result of sympathetic irritation. Dr. Hodgkin is of opinion that peritoneal gastritis is little more than a nosological distinction, and scarcely exists in nature. As his authority is great, it may be as well to mention that a man was brought into St. Thomas's, after having received a kick from a horse on the abdomen, below the umbilicus. He shortly died. The part of the abdomen where the injury had been received was not even discoloured, but there was extensive ecchymosis among the muscles beneath. The peritoneum was diffusively, adhesively, and suppuratively inflamed in different parts, while the peritoneum covering the stomach evidently partook of the general inflammation. A rupture also existed of the intestines.

The peritoneum is liable to become indurated, and more especially in those parts covering the spleen. There are two specimens in the Museum of St. Thomas's Hospital, in one of which the peritoneal coat of the spleen is cartilaginous, and in the other bony matter is largely deposited. It appears that this state is sometimes general, for " in one case," says Dr. Baillie, " I have seen a great many cartilaginous excrescences growing from the peritoneum. They are of a small size, most of them not larger than a garden pea. They were a little softer than the cartilages of the bones, but had the true structure of cartilage," p. 132. Ramollissement of the peritoneum is frequent, but not so frequent as of the mucous membrane.

Hydatids have occasionally been found in large numbers swimming freely in the fluid of ascites. They more frequently, however, according to Dr. Baillie and Dr. Hodgkin form beneath the peritoneum, and give rise to tumors, sometimes of an enormous size. Mr. Abernethy mentions having found a fatty tumor attached to the peritoneum.

Symptoms.—Peritonitis may be acute or chronic, partial or general.

Peritonitis is occasionally ushered in by some previous shivering and fever, but in many cases there are no preliminary symptoms.

If acute peritonitis is of that intensity which may terminate by resolution, or by effusion of serum, or of lymph, the patient complains of a severe pain in the abdomen, which is increased on pressure; he lies on his back, fearing to move. His pulse is from 90 to 120, and in proportion as it is frequent, so is it smaller; his tongue is coated, and his bowels constipated or regular. If serum be effused, that event can be determined by the fluctuation; or if lymph, by a rubbing sound heard under the stethescope. The course of these forms of acute peritonitis varies from a few hours to 10 or 14 days.

When acute peritonitis, however, is of that intensity that it will terminate in effusion of pus, the symptoms are infinitely more formidable. The pain in the abdomen is the severest that human nature can suffer. The patient indeed lies on his back, but his legs are drawn up and bent so as to relax as much as possible the abdominal muscles. Still, although the pelvis is fixed, he is restless, unable to bear the slightest pressure, not even the weight of a sheet, and is incessantly tossing his arms about in every direction. The state of his tongue and bowels are similar perhaps to what have been described, but his pulse is excessively small and rapid, varying from 130 to 150, while his stomach is often distressingly affected by retching and vomiting. These symptoms perhaps continue without intermission for 24, 48, 72, or more hours; when, with or without some previous shivering, pus is effused, and the pain from being agonizing is now bearable. The subsidence of the pain, however, is not followed by any amendment; on the contrary, a most alarming collapse succeeds, a cold clammy sweat breaks out over the body, while hiccup, and a pulse hourly increasing in frequency, proclaim the entire hopelessness of the patient surviving beyond a few hours.

When acute peritonitis is confined to the liver or other organ, the pain is often limited to that part, while the other symptoms vary according to the severity of the affection and the organ attacked.

Chronic peritonitis often takes place to a great extent, and without any great amount of suffering. The symptoms are rather those of abdominal soreness and uneasiness than of pain, together with a full but sometimes rapid pulse. The intestines indeed may be glued together, and sometimes pus has been found effused, without the patient suffering more than in ascites. When chronic peritonitis is partial, as of the liver or spleen, the patient often experiences a dragging pain, which is increased by change of position, and arises from the parts being suspended by adhesion.

Diagnosis.—The pain being greatly increased on pressure, and the pulse rapid, together with the general uneasiness and evident danger of the patient, readily distinguish peritonitis from colic or leucorrhœal pains.

Prognosis. — Partial peritonitis often terminates without in any sensible degree impairing the general health; thus we often find extensive adhesions of the liver without any marked symptoms. In every case, however, in which the structure of the peritoneum is thickened or otherwise impaired, the patient may recover, but generally relapses and dies of dropsy; for the peritoneum, like all other serous tissues, appears to possess little power of restoration after disease. Every attack of acute inflammation is of grave prognosis, and when pus is effused, it is uniformly fatal; neither will the patient recover if the peritonitis is caused by subperitoneal tubercles.

Treatment.—The treatment of acute peritonitis must be active, and there are few diseases in which the life of the patient is more completely in the hands of the practitioner. The activity of the treatment must be proportioned to the amount of pain and the rapidity of the pulse. In the milder forms of the disease, when the pain is bearable, and the pulse steady, and under 100, one bleeding from the arm, or 20 leeches over the abdomen, together with pil. hydrargyri, gr. v., n. m., and moderate purging with neutral salts, combined with an opiate, are sufficient to effect a cure. In the severer forms of disease, and with a tendency to effusion of pus, all these modes of treatment must be combined, and carried to a considerable extent. Thus 16 to 30 ounces of blood should be taken from the arm, and 30 leeches applied to the abdomen, and a poultice afterwards to encourage the bleeding. Bleeding, however, is not enough, for sometimes when carried so far as to affect the patient's head, and to cause temporary insanity, the peritoneal inflammation is not subdued. It is necessary, therefore, to have recourse to mercury, and with a view to affect the mouth; and five grains of calomel, combined with half a grain of opium, so as to give the patient some relief from pain, should be exhibited every four, six, or eight hours, according to the intensity of the disease. As soon as the mouth is affected the patient is relieved, and at this point the mercury should be omitted, and the patient moderately purged with neutral salts, combined with an opiate, and he often recovers.

The treatment of chronic peritonitis must be directed by the same principles; but we should be content with effecting a present alleviation of symptoms, and without attempting the removal of the mischief which has already occurred; for in patients that have laboured under chronic peritonitis, and survived many years, the peritoneum has still been found opaque, thickened, and silvery, so that in all probability these alterations are permanent.

The diet of the patient in the acute forms of peritonitis should be rigidly slops.

Of Inflammation, and other simple Organic Diseases of the Respiratory Organs.

Angina—Cynanche—*Sore Throat*—

Is an inflammation of the parts constituting the fauces; 659 cases are reported to have died in the year 1839 of quinsey, a popular name for sore throat.

Remote Cause.—The fauces are unquestionably acted upon by many morbid poisons, as that of scarlet fever, of small pox, of syphilis, and of influenza. Indeed the generally contagious nature of sore throats would lead us to believe that they are a class of disease determined in 19 cases out of 20 by some ephemeral or other morbid poison. In a few cases it appears to arise from cold, while a few more are caused by children accidentally drinking boiling water out of the spout of a tea-kettle. Occasionally it is produced by mercury or by mineral acids taken for the purposes of self-destruction.

Predisposing Causes.—Children from a very early period of life are exceedingly liable to sore throats; it is also very common in early adult age, but after 50 is comparatively infrequent. The sexes appear to suffer in nearly equal proportions. For in the year—

1838 . . 206 men and 206 women
1839 . . 353 ,, 306 ,,

are reported to have died from this affection. The seasons most pregnant with this disease are spring and autumn.

Pathology.—The common law of sore throats is that the poison produces fever, and after a few hours the patient complains of sore throat, which is of various intensity, the mucous membrane of the fauces being liable to the diffuse, the serous, the adhesive, and to the ulcerative inflammations, the latter sometimes terminating in gangrene. The substance also of the tonsils and uvula is likewise liable to all the inflammations that have been mentioned, and also to the suppurative inflammation, and these inflammations may be acute or chronic.

The mucous membrane of the fauces is often diffusely inflamed, when the patient complains of the throat being hot, rough, and dry, and, on examining the mucous glands they are found enlarged, the faucial membrane redder than usual, and all secretion stopped. This inflammation may terminate by resolution, or it may proceed, and it is probable, in a few cases, as in salivation, serum may be effused. More commonly, however, lymph is thrown out first in points, which sometimes coalesce, covering a considerable space. The more usual termination of these inflammations, however, is by ulceration at the surface of the membrane. When ulceration takes place, a slough forms, and is detached at various periods, or from a few hours to six or seven days. The ulcers are of very various forms, round or oval; sometimes entirely superficial, and then again deeply burrowing; and as inflammation of the tonsils is generally of a low character, they sometimes terminate in gangrene. The parts of the membrane most prone to ulceration are those covering the anterior and external surfaces of the tonsils and uvula, and also the posterior edges of the palate. When, however, the uvula is affected, it should be remembered that the ulceration may commence at the posterior surface, so that, in bad cases, that part may almost slough away unperceived, unless closely watched.

Besides the mucous membrane, the substance of the tonsils and uvula may inflame, and in this case the tonsils are red, loaded with blood, and moderately swollen, while the uvula is not only red and swollen, but greatly elongated, so that it rests on the base of the tongue, causing a most disagreeable sense of titillation. The disease may advance, and lymph or serum be thrown out, and in this case the tonsils are often greatly swollen, so as in some instances almost to occlude the passage of the fauces. The diagnostic symptom between the effusion of serum and of lymph is that, in the latter case, the tonsil remains often permanently enlarged, the lymph effused having been organized. In a very few instances an abscess forms in the tonsils, which ultimately ruptures and discharges a greater or less quantity of pus. It generally happens that both tonsils are affected, but occasionally the inflammation is limited to one tonsil.

In chronic inflammation of the tonsil the same phenomena are seen, but the course of the disease is slower, and the colour of the parts less vivid, and in general differing little from their natural tint.

The inflammation of the fauces, whether acute or chronic, not unfrequently extends to the pharynx; and its mucous membrane may in like manner take on the diffuse, serous, adhesive, or ulcerative inflammations. The inflammation also may commence in the subcellular pharyngeal membrane, and an abscess occasionally forms in that part. In a smaller number of cases, by an extension of the original disease, the epiglottis, glottis, and even the larynx are affected. In bad cases, as after severe scarlatina, it may also spread to the Eustachian tube, and cause suppurative or other inflammation of the mucous membrane of the internal ear. It sometimes also extends up the nasal passages, by which respiration through those passages is much impeded or rendered impossible, so that the patient breathes with his mouth open.

The tonsils have also been found to contain cysts, hydatids, and also to he the seat of calcareous formations.

Symptoms.—The different degrees of intensity which attend this affection allow us to divide sore throat into angina mitior and into angina gravior.

Angina gravior is usually preceded by some shivering and fever, which having lasted a few hours, the patient has the sensation of a sore throat. He finds deglutition difficult and painful, and what he attempts to swallow is perhaps rejected through the nostrils; his voice is altered, being hoarse and nasal, and he can hardly breathe through his nose; his ears are also painful, and he finds it troublesome to free his throat from the viscid matters which adhere to it. The fever does not abate on the appearance of the local symptoms, but usually continues till the sloughs are detached, after which, if the case be properly treated, it declines, and the patient rapidly recovers. If, however, he be improperly treated, the patient often becomes delirious, showing under these circumstances that a poison still remains in the system, and acts on the brain and its membranes. Indeed the degree of prostration which often attends sore throat is so constantly out of all proportion to the local lesion, that it is impossible not to come to the conclusion that the angina very constantly results from a cause acting on the system generally. The fever, however, when the case is properly treated, generally subsides in three or four days, seldom lasts more than a week, after which the patient rapidly recovers, though in other cases that event may be delayed for two, three, or four weeks. This form of disease admits of two varieties, or that in which the tonsils are greatly swollen, and the ulcers for the most superficial, and that in which the tonsils are greatly loaded with blood, little swollen, and the ulcers deep and burrowing. The latter only is dangerous.

The symptoms of angina mitior differ merely in degree from the former, the fever being milder, and the tonsils only moderately swollen, and the ulcers always presenting a healthy appearance. This form of disease almost always terminates in a week or ten days.

The chronic forms of the disease are unaccompanied with fever, and when the result of simple inflammation, the tonsils are usually greatly enlarged, and the seat of one or more superficial ulcers, often covering its whole surface.

Diagnosis.—As the parts are visible, no mistake can possibly take place with respect to the existence of this disease, although it may be difficult to determine its exact cause.

Prognosis.—The instances are extremely rare in which a patient falls from angina.

Treatment.—The treatment of angina is extremely simple, and is determined by the state of the tonsils. When the tonsil, for example, is little swollen, there is hardly a case which resists four ounces of wine daily mixed with water, arrow-root, or sago, together with attention to the bowels, and this whether fever be or be not present. On the contrary, if the disease be neglected, or the patient be badly treated and bled, the fever is increased, delirium ensues, and the ulceration spreads, involving the possibility of its terminating in gangrene. Again, if the tonsil be greatly enlarged, a few leeches should be applied externally to the upper part of the throat, and these should be followed by a poultice and by gentle purging, with the mildest cathartics. On the contrary, should this state of parts be neglected, or the patient treated by tonics, the mischief is not so great as in the former case, but the fauces may be closed, or nearly so, and perhaps remain permanently enlarged, or an abscess may form, and in either event the condition of the patient is for a time rendered highly distressing, and in appearance even dangerous. Many practitioners are in the habit of using gargles, or blisters, or caustic; but these are for the most part unnecessary, often injurious, and partake greatly of the "nimia diligentia medicorum." In every case the patient should be strictly debarred from animal food till the throat be healed.

If, after the throat is healed, the tonsils should remain permanently enlarged so as to affect the speech, something should be done to effect their diminution; and perhaps the removal of a very thin slice is the most efficacious, for although often intractable to all other treatment, they frequently yield to this operation. Mr. Liston indeed states, that he has practised this method on public singers, and without in any degree impairing the compass, tone, or flexibility of their voices. When the uvula is permanently elongated from a similar interstitial deposit, astringent lotions are of little efficacy, and the removal of a portion either by the knife or ligature appears to be the only remedy.

Epiglotitis—Laryngitis—*Croup*—

Is an inflammation of the mucous membrane of the epiglottis, glottis, or larynx, and very commonly of all those parts.

It has often excited much surprise that a disease so distinctly marked in its symptoms should not have been accurately described before the middle of the XVIIIth Century, when Dr. Horne published a treatise on the suffocatio stridula, or croup, in 1765. This defect, perhaps only explicable on the ground of the little encouragement and fostering patronage with which the labours of the physician have been at any time cheered, is now supplied, for the disease is well known in this country, and is of great fatality; 4192 persons being reported to have died of it in England and Wales in the year 1839, or perhaps one child in twelve dies of this complaint.

Remote Cause.—There are some morbid poisons which unquestionably act on the larynx, as the paludal poison; also the poison of scarlet fever, of the hooping-cough, of the small-pox, and of syphilis. The annals of medicine also are rich in descriptions of epidemic and endemic croup, whence it would appear this latter affection was generally produced by some unknown poison. This is so much the case, that M. Baudelocque, physician to the Hôpital des Enfans, where 3000 cases are admitted annually, says, that sometimes for three years together he has not seen a single case, while M. Guersent's experience has been to the same effect. In other years, however, they have witnessed large numbers affected with this disease. These facts appear inexplicable from the mere play of atmospheric vicissitudes, and appear strongly to point to a specific cause. Sudden changes, however, from heat to cold, an easterly wind, the irritation of teething, are the other principally alleged causes of laryngitis. As a secondary affection, it arises in the adult from phthisis, from disease of the œsophagus, and from the pressure of an aneurismal or other tumor.

Predisposing Causes.—No age is exempt from laryngitis; but age greatly influences the occurrence of it. Perhaps the statement of Andral is an approximation to the truth. Thus, out of 288 cases he found 237 occur from birth to seven years old; and from this period up to 70, the deaths from laryngitis, taking decennial periods, were nearly in equal numbers in each division. As to the effects of sex, out of 543 children, 293 were boys, and 218 girls, the sex of 32 not being determined. Of adults that died of laryngitis in England and Wales in 1839, 40 were males and 22 females.

This difference of liability between the male and the female is probably merely owing to difference of exposure to the exciting cause. Mr. Farr calculates that deaths in towns from croup, compared with those from croup in the rural districts, are as 1 to 1·31.

Pathology.—The mucous membrane of the epiglottis, glottis, and larynx, is liable to the diffuse, the serous, the adhesive, to the suppurative, and to the ulcerative inflammations; and these inflammations may be either acute or chronic.

When the mucous membrane of the parts which have been mentioned is diffusely inflamed, its colour is in general of a deep venous red, while from some interstitial deposit it becomes thickened. This state of parts may occupy the whole larynx, or may be limited to its superior portion, to the chordæ vocales, or to the ventricular cavities; but when general and excessive, death, with all the symptoms of croup, has occurred, without the slightest effusion of lymph or other morbid product.

Diffuse inflammation may terminate by resolution, or it may proceed, and serum or pus be effused. These latter inflammations often take place in these parts, without any grave or serious accident arising to the patient, and almost without leaving any pathological phenomena behind them. When, however, the disease terminates by ulceration, or the throwing out of lymph, the case is often fatal, and the lesions extremely well marked.

Ulceration of the larynx is seldom seen in children, but is not unusual in the adult; and it is from this form of laryngitis that persons above the age of 10 years commonly die when afflicted with this disease. The number and size of the ulcers vary greatly; sometimes they are small and numerous, while, in other cases, there is only one, and that of considerable size, occupying the whole of the ventricle, or even a larger portion of the larynx. The base of the ulcer is generally the fibrous tissue, but sometimes it penetrates much deeper, involves the thyroid cartilage, and occasionally even perforates it, so as to produce a fistulous opening communicating externally, the voice being entirely lost, except an obturator be placed over the orifice. The principal seats of the ulcers are the epiglottis, the chordæ vocales, the ventricles, the angle formed by the union of the two thyroid cartilages, and posteriorly by the portion between the two arytenoid cartilages.

The most remarkable pathological phenomena of croup, however, are those caused by the *adhesive inflammation* terminating in the effusion of lymph, and the formation of a false membrane, a form of inflammation which, though sometimes seen in the adult, is nevertheless almost peculiar to children. The membranes thus formed vary much in thickness and consistency. Some are so thin that the mucous membrane is readily seen through them, while others are many lines in thickness, exceeding even that of the mucous membrane itself, and consequently opaque. With respect to their consistency, some are so little coherent, that they are almost diffluent, while others can be detached for a considerable extent without rupturing. The false membrane, though occasionally only partial, yet more commonly embraces the entire circumference of the larynx, forming a complete hollow cylinder, adapted to the walls of the larynx. The membrane is in most instances limited to the larynx, but in some cases it extends down the trachea to the bifurcation, while in a very few cases it reaches even to the minutest branches of the bronchi. M. Hussenot says, of 120 cases he examined, in 78 it did not extend beyond the larynx, while in 42 cases it invaded the trachea or bronchi. The membrane thus formed is, in a few instances, removed by the cough, but more generally it adheres with so great tenacity that Gendrin conceives that it can only be detached by a thinner and more serous secretion taking place from the mucous membrane beneath it, which loosens and displaces it. No well-authenticated case exists of this false membrane having been found organized.

Besides inflammation of the mucous membrane of the larynx, &c., at its free surface, the connecting cellular tissue is probably the occasional seat of all the inflammations that have been mentioned. Thus the loose cellular tissue around the glottis is often seen red, injected, and thickened, and likewise the seat of extensive serous effusion, greatly contributing to the death of the patient. Bouillaud and Andral have also both seen abscesses of the submucous cellular tissue of the larynx. Abscesses have also formed in the superior portion of the œsophagus which have burst into the larynx.

The mucous membrane of the larynx, in addition to being the seat of inflammation, is sometimes affected with *Ramollissement.* We are astonished to find, says Andral, on examining individuals (*Anat. Pathol.* tome ii. p. 473) who have been a long time hoarse, no other lesion of the larynx than a partial softening of the mucous membrane, especially of the chordæ vocales, and of the base of the ventricles, nearly denuding perhaps the resplendent fibres of the thyro-arytenoidean ligaments, which are now merely covered with a red or whitish pulp.

In a very few instances polypous growths take place from the mucous membrane of the larynx, as from that of the pharynx or nose, and which gradually increasing, at length destroy the little patient.

Besides inflammation or other disease of the mucous membrane of the larynx taking place, the parts beneath are often the seat of many different affections. Thus the muscular tissue of the larynx, arranged so beautifully in distinct fascia, and fulfilling such important functions, is sometimes found atrophied, hypertrophied, softened, or more or less completely destroyed, and causing marked alterations of the voice. It is seldom that the os hyoides is found diseased; but in a case that died some years ago in St. Bartholomew's Hospital, with symptoms of most severe laryngitis, that bone was found necrosed and separated at its apex, so that the soft parts had fallen in, and the patient died suffocated.

The cartilages of these parts also are often the seat of disease. Thus the cartilage of the epiglottis often loses its normal form in consequence of inflammatory contraction of the mucous membrane covering it. This cartilage also is sometimes from the same cause much less moveable than in health, and in some very few instances it has been seen ossified. In other cases it has been removed more or less completely by ulceration, commencing either within itself, or else extending from the mucous membrane. The other cartilages of the larynx, as the thyroid and cricoid, are often similarly diseased, and may be ulcerated, perforated, or necrosed, and in some cases suppuration has taken place at the articulation of the cartilages, and the ligaments been destroyed.

Ossification of the thyroid and of the cricoid cartilages is a normal phenomenon in old persons, but it may take place prematurely, and then it is morbid. No case, however, is known of ossification of the arytenoid cartilages.

Symptoms.—Croup may be preceded by sore throat, by catarrhal symptoms, or by a short dry cough, or it may occur *per se*, and without the general health being sensibly impaired. In either case the attack commonly takes place during the night, the sleep of the child, which was perhaps more or less agitated, being interrupted by fits of hoarse coughing. These become more frequent, the respiration more difficult, and marked by a peculiar wheezing, which has been described as varying from the sound of an inspiration forcibly made with a piece of muslin before the mouth, or to air passing through a brazen tube. The little patient also feels a sense of constriction about the throat, which she marks by carrying her hand often to it, and grasping the larynx. After the paroxysm has lasted some hours, there is an interval of ease, which perhaps lasts for some hours, till the excitability of the parts is again accumulated.

By the end of the second or third day, sometimes sooner, the tongue becomes white, the heat of the body increased, the pulse frequent, the countenance livid and distressed. From this point the disease now rapidly advances, the croupy sound attains its height, and Dr. Horne describes it as " vox instar cantus galli ;" others have compared it to the noise which a fowl makes when caught in the hand; while the child often puts its fingers into its mouth, as if to pull away something which obstructed the passage.

As the disease draws towards a close the paroxysms become more frequent, the cough more severe, the pulse more rapid, suffocation more imminent, and the extremities cold and livid. The final close of the disease is often by convulsions, sometimes almost tetanic; and Dr. Ferriar once was present when the struggle was so violent that after death the corpse in a great measure rested on the occiput and on the heels.

It is seldom that children expectorate; but in happier cases than the above, mucus, tinged perhaps with blood, is coughed up, and later perchance the false membrane is detached and thrown up, and the patient recovers.

The croup which has been described is of the acutest kind, but in many cases its course is much more chronic, the symptoms generally milder, and the intervals of ease longer and more complete; and during which the breath is free, the child cheerful, and the appetite good. In the course of a few days, however, a violent paroxysm seizes the child, and destroys him with every appearance of one strangled.

The internal fauces, as the tonsils, uvula, velum pendulum palati, are sometimes seen inflamed and ulcerated, while in other cases the fauces are healthy.

Several cases are on record of croup having terminated in 24 hours; more frequently, however, the child lives to the third or fourth day, and in chronic cases much longer.

According to Barth, on the stethescope being applied to the larynx, we hear a sort of " tremblotement," as if a moveable membrane was agitated by the air; and he considers this phenomenon as an unerring evidence of the existence of a false membrane in the larynx.

Laryngitis in the adult is marked by the same difficulty of breathing, the same lividity of countenance, the same constriction of the throat, by the same paroxysmal attack, and by the same exemption from any severe constitutional affection. The voice, however, instead of being sharp and shrill, is generally deep and hoarse, although sometimes altogether lost; differences depending perhaps on the greater size of the glottis, and on the fact of the parts being the seat of ulceration, rather than of the effusion of lymph. At length the patient is cut off in one of the paroxysms. The duration of this disease, when acute, is short. The celebrated Dr. Pitcairn died on the fourth day from the first attack, and Sir John Hay, physician to the forces, died within the same period. More commonly, perhaps, the disease passes into a chronic state, when the patient may survive many weeks, or even months.

Polypus of the larynx is a rare disease. In one case a child between three and four years old had laboured for more than two years under attacks of croupy breathing, but without greatly suffering in her general health. At length her voice became permanently stridulous and shrill, with severe paroxysms of difficult breathing; in one of these she died, when a small polypus about half an inch in length, and adhering by a pedicle, was found growing from the posterior portion of the larynx.

Ossification of the cartilages alters the timbre of the voice and deepens its tones, but does not produce any general or local inconvenience.

Diagnosis.—Inflammatory croup in the child is to be distinguished from false croup by the latter being sudden in its attack, and by the voice being extremely hoarse instead of shrill, the glottis not being obstructed by any adventitious membrane. In the adult we must distinguish inflammatory laryngitis from sympathetic laryngitis, and from that caused by the pressure of an aneurismal or other tumor, as enlarged glandulæ concatinatæ.

Prognosis.—The danger of croup is to be determined from the violence of the local symptoms and the frequency of the paroxysms, rather than from the constitutional symptoms. Children, however, seized with croup recover in a very small proportion.

The adult also, after ulceration has taken place, seldom recovers; but his case is not so hopeless as that of the child.

Treatment.—When the croup in children commences in the larynx its course is so rapid and so fatal that the measures for its suppression must be early and energetic. Bleeding, and especially local bleeding, should be employed, and in most cases to a considerable extent, and two to twelve leeches, according to the age of the patient, should be applied over the larynx; and after these have fallen off the bleeding should be encouraged by the application of a linseed poultice to the throat. This first bleeding often gives great relief, and sometimes stops the disease; but if not, the leeches, after a few hours, may be repeated. As soon as some relief is obtained a blister should be applied, and after that is removed the part should be dressed with strong mercurial ointment. Besides this local treatment it is usual to give mercury by the mouth; some practitioners even give it as largely as one to two grains every hour, and Brettoneau says he has given as much as three scruples in twenty-four hours. This ultra active treatment, however, looking to the great mortality attending croup, can seldom have been successful; and it may be doubtful whether in many instances it has not accelerated the fatal termination.

In addition to bleeding, blistering, and mercury, many practitioners prescribe emetics; first, because their depressing effects and the large evacuations they produce lower the vital power and favour the resolution of the inflammation; and again, because the effort of vomiting may be the means of detaching and of expelling the false membrane, should it have formed.

Bleeding, blistering, and mercury, although the rule of treatment in idiopathic infantine croup, are, for the most part, entirely inefficient in those cases in which the affection begins in the fauces, as in the case of many epidemics, and especially after scarlatina. In these cases the best treatment, if the false membrane be not already formed, is to treat it as a case of scarlet fever, and to relieve the throat by the application of a few leeches, and then to support the little patient with a moderate quantity of wine diluted with water. Several cases recently treated in this manner all recovered, while two that were extensively bled died. If the false membrane has formed, perhaps an emetic affords the only chance of relieving the patient.

In the adult the pathological phenomena are somewhat different from those of childhood, the mucous membrane of the larynx being foi the most part ulcerated, and the cartilages often diseased. Large bleedings, consequently, as they have little tendency to heal the ulcerated part, or to remedy the affection of the cartilages, have little or no beneficial influence over the disease. Dr. Pitcairn was once copiously bled, and Sir John Hayes was bled from 30 to 40 ounces, but they both died. Local bleeding may be employed to relieve the fulness of the throat, but beyond this bleeding is of little value. Mercury, however, appears a powerful resource in these cases; and mercury, introduced either internally or by inunction, so as to affect the mouth, uniformly gives relief as soon as the constitutional affection is established. Unhappily, however, the amelioration is transitory, for almost as soon as the mouth is healed the symptoms return, and the patient again lies in imminent danger. Another salivation produces another cessation, but equally temporary, and the patient ultimately falls. It may be problematical whether we possess any more powerful remedy for this affection; but in two cases in which the disease was very marked, so much so that in one there was a fistulous opening externally, the oxyde of platina, exhibited in doses of two grains three times a day, cured the patients, after mercury and many other remedies had failed. A third case has also been treated in the same manner with equal success very recently. This substance acts as an emetic in doses of grs. iij. to grs. v. Platina, however, is quite useless when the laryngitis is a secondary disease, and caused by phthisis or syphilis; it is also useless when the laryngitis depends either on a diseased state of the cartilages, or of the os hyoides.

The medical treatment of laryngitis, both in the child and in the adult, is so frequently unsuccessful that tracheotomy has often been had recourse to as the means of prolonging life, and consequently as affording an additional chance of the patient's recovery. Guersent has performed this operation repeatedly at the Hôpital des Enfans, but almost always without success; on the contrary, Trousseau states he has saved one-third of his patients. Perhaps the experience of the profession is equally discordant on this point; for those who operate early, and perhaps often most unnecessarily, contend they save some portion of their patients, while those who wait till a case is made out before they resort to this experiment for the most part lose all their patients. The cause of death after the operation is often extremely perplexing, for the patient, whether a child or an adult, often revives, breathes freely, and the local inflammation from the use of the knife is generally trifling, and yet the patient dies. Some physicians attribute this result to congestion and disease of the lung itself; but as the patient often lives for three or four days tranquil, and almost without cough, this hypothesis does not appear satisfactory. The fatal result, therefore, seems rather to depend on a cause acting generally on the system, and which destroys the patient. It must be admitted, however, that in a very few instances, when the croup perhaps is the result of a local cause, that the patient, whether a child or an adult, does recover. Dr. James Johnson lately mentioned, at the Medical and Chirurgical Society, an instance of a man who had lived 27 years breathing through a canula inserted low in the trachea. It should be remembered that in the adult the cricoid cartilage may possibly be diseased, and consequently it is desirable the incision for tracheotomy should be as low down as possible.

Of Tracheitis.

The remote and predisposing causes of this affection are nearly similar to what have been mentioned as producing laryngitis. As to its pathology, the mucous membrane of the trachea is liable to the diffuse, the serous, and the suppurative inflammation, and all these occur frequently in the course of a common cold, and without any marked or dangerous symptom. In a very small number of cases lymph is found effused on the free surface, but most likely this form of disease is always an extension of laryngitis or of bronchitis. Ulceration of the trachea is extremely infrequent, except in phthisis, when the ulcers occupy, by a species of election, the posterior portion of this canal. When they are primary they sometimes are seen in other parts of the trachea.

The cartilages of the trachea are rarely the seat of disease; but they also are liable to be inflamed, perhaps ulcerated, and certainly necrosed. A case of this kind occurred some years ago in St. Thomas's Hospital: the patient, a stout young woman about 20 years of age, laboured under much hoarseness and difficulty of breathing, but her general health was good. She died suddenly in the night, and as was supposed from spasm of the glottis. On examining her, a small ulcer was found in the mucous membrane of the trachea, and beneath it the cartilage was necrosed and broken. Andral once met with a case of abscess of the thyroid gland, with complete destruction of the cartilages of the trachea, and the pus of the abscess had made its way so as to have raised up the tracheal mucous membrane. Portal also gives a case in which hydatids of the thyroid gland perforated the trachea, and suddenly destroyed the patient by asphyxia. A larynx was lately shown at the Medical and Chirurgical Society of which the three upper cartilages appeared to have been absorbed, and that without any apparent cause. The patient died at length asphyxiated. The cartilaginous rings of the trachea are occasionally seen ossified, but even this is a very rare circumstance.

Of Pneumonitis.

Pneumonitis is an inflammation of one or more tissues of the lungs. Thus the bronchial membrane may be inflamed, causing *bronchitis;* or the substance of the lung may be inflamed, causing *pneumonia;* or the pleura may be inflamed, causing *pleuritis;* and two or more of these inflammations may exist at the same time. The number of persons reported to have died of these complaints in England and Wales, in 1839, amounts to 20,402; or from bronchitis, 1663; from pneumonia, 18,151; and from pleurisy, 588; thus causing the death of about one person in sixteen.

The class of disease now about to be treated of was well known to the ancients, but we owe much to Avenbrugger and Laënnec for having studied the physical properties of the chest, and demonstrated the great changes the natural sounds heard by auscultation or produced by percussion undergo when the different tissues of the lungs are affected, and which have enabled the moderns to give a precision to their diagnosis of disorders of the chest entirely unknown to those who have preceded them.

Remote Causes.—Inflammatory affections of the lungs are caused by many morbid poisons, as the poison of typhus fever, of the measles, of small-pox, of influenza, and also of the paludal poison. It is probably owing to the action of the last poison that, although as a general principle diseases of the chest diminish in frequency as we approach the equator, yet that in the West Indies the inflammatory pulmonary affections greatly exceed those of this country. In the more northern climates these affections are intimately connected with atmospheric vicissitudes, as cold and wet; at least we find them prevailing most in those months in which the temperature is lowest. Thus, in the winter quarter, 3891 persons fell from these causes; in the spring quarter, 2823; in the summer quarter, only 2057; and again in the autumnal quarter the numbers amounted to 3799. Mechanical injuries, as blows, especially if a rib be fractured, are also occasional causes of pneumonitis. As a secondary affection, pneumonitis may be caused by phthisis, by the presence of hydatids, or by the pressure of an aneurismal, cancerous, or other tumor.

Predisposing Causes.—Young children are often attacked with pneumonitis; adult age is still more liable to that disease, that period of life being most exposed to all the great moral and physical causes of disease, as well as to the action of many morbid poisons. Old age is most liable to that form termed bronchitis; and this arises from the decline of the powers of life, which often first shows itself by disease of the organs supplied by the eighth pair, as the heart, the lungs, or the stomach. It appears that men are something more exposed to all these affections than women. Thus there died in

	1838		1839	
	Men.	Women.	Men.	Women.
Of Bronchitis .	1,193	874	916	747
Pleurisy .	329	253	342	246
Pneumonia .	9,887	8,112	10,000	8,157

The effects of those many causes which deteriorate the health of the inhabitants of towns are extremely marked in the production of pneumonitis, for, out of a million of persons living in towns, 2028 died; while out of a similar number of agriculturists, only 905 fell in 1839. Having thus spoken of the general and predisposing causes of pneumonitis, it will now be necessary to speak of the pathology of the different tissues composing the lung, and first of *bronchitis*.

Pathology of Bronchitis.—The mucous membrane lining the bronchial tubes is liable to the diffuse, the serous, the adhesive, the suppurative, and to the ulcerative inflammation, and these may be either acute or chronic.

In red diffuse bronchitis we find the inflamed portions of the mucous membrane of a deep venous red, and this redness may be general or partial, and when partial it may be in spots or streaks, determined perhaps by the cartilages. This inflammation, when at its height, is probably void of secretion, and the membrane consequently dry, and giving rise to the "catarrhe sec" of Laënnec. This may at first terminate by resolution, or it may pass into the serous inflammation, when the mucus first secreted is thin, watery, and even frothy like saliva, but which subsequently becomes thicker and more consistent; and again it may take on the suppurative inflammation and pus be effused. In a very few cases lymph is thrown out, forming a false membrane, and in a still smaller number (except in phthisis) ulceration of the bronchial membrane occurs, and this may take place from within outwards, or from without inwards, but the latter is by far the most common.

Most authors affirm that the bronchial membrane, when inflamed, is thickened, and more particularly at the points of division, and that the various râles depend on the degree of thickening of this membrane, slight alterations of diameter producing great alteration of sound. Andral even says that the mucous membrane of the smaller bronchi may be so thickened as to cause a complete obstruction. This thickened state of parts, however, is very difficult to demonstrate, and many intelligent pathologists have never witnessed it, and consequently attribute the different râles so often heard in bronchitis to spasmodic contraction of the circular fibres.

The bronchitis may affect one lung, or both lungs, or a part of a lung, and the upper lobes are more commonly affected than the lower ones. The larger bronchi are also supposed to be more commonly inflamed than the smaller ones.

Although it is by no means uncommon to find red or chromatous inflammations of the bronchial membrane, yet it is equally common to find various forms of achromatous inflammation. Thus nothing is more usual than to find the mucous membrane beneath a purulent secretion either natural in colour or else paler than in health, so that the most profound pathologist is unable to distinguish the morbid from the healthy state.

The cartilages of the bronchi are occasionally found dilated, forming a small bronchial pouch. They are also sometimes hypertrophied, and, instead of points, form imperfect rings, as in the larger bronchi or in the trachea. The cartilages also, in some rare instances, have been found ossified; and Andral gives a case of an old man dead at Bicêtre, whose lung presented the ramified appearance of a piece of hollowed coral, or of the branches of a tree; he considered these to be the last ramifications of the bronchi in a state of ossification. The cartilages of the bronchi, when the lung has been long collapsed, appear to be absorbed, hardly a trace of them being discoverable.

Hydatids have occasionally been coughed up from the lung, perhaps formed in the bronchial membrane in the same manner as in the mucous cavity of the uterus or bladder. Some very rare instances are also given of polypous growths from the bronchial membrane.

Pathology of Pneumonia.—The substance of the lungs is liable to the diffuse, the serous, the adhesive, the purulent, the ulcerative, and to the gangrenous inflammations; and these inflammations are all *acute*, chronic inflammation of the substance of the lungs, according to many writers, being unknown.

The characters of diffuse inflammation of the substance of the lungs are the lung being more loaded with dark venous blood than usual, and its texture being more easily broken down than in health ; air, however, still penetrates the bronchial cells, and consequently the lung still crepitates, swims in water, and, if washed, the colour is restored. This inflammation may terminate by resolution, or it may pass into some higher degree of inflammation.

When serous inflammation succeeds, the lung is in the same gorged state, but in addition it is loaded with serum, so that on cutting into it a watery fluid mixed with blood streams from it as from a sponge. The lung now no longer crepitates, is enlarged, often takes the impression of the ribs, and does not collapse when the chest is opened.

At a higher degree of inflammation lymph is thrown out, and the lung is now technically said to be in a state of red hepatization, or, as Andral has termed it, red softening. This state has many degrees. In some instances the lymph effused is very large in quantity, mixed with blood, and can be readily separated, or, as it were, *shelled* out of the lung, and in this loose state it is not organized. In the other extreme of this form of inflammation the lymph effused has become organized, and forms an integral part of the lung, which now becomes so solid that, if cut, it represents with much accuracy a portion of the liver or spleen. In this state it contains at the diseased part little or no air, does not crepitate, and sinks in water ; it cannot be injected, is of a deep venous colour, while its texture is easily broken down and penetrated by the finger. The lung also is enlarged, and does not collapse when the chest is opened.

A still more severe form of pneumonia is suppurative inflammation, and the pus effused may be either infiltrated or contained in an abscess. Infiltration is by far the most common ; and although this form of disease may occur *per se*, yet in the belief of most authors it more generally follows red hepatization. In this latter case the pulmonary tissue, red, dense, compact, and impermeable to air, passes to a grey colour, and hence it is termed grey hepatization. The structure in other respects of either form of hepatization appears to be the same ; for if we examine them with a microscope, we find the same granulations, only they are white or grey instead of red. There are instances, however, in which these are wanting, and we observe only a grey smooth surface.

In the grey, as in the red hepatization, the pulmonary tissue is easily torn, and the quantity of pus infiltrated is sometimes so great that, on cutting into the lung, that fluid readily flows from it ; at other times the pus will not flow on a simple incision, but exudes by compression.

Although pus is more commonly diffused through the pulmonary parenchyma, yet sometimes it is collected into an abscess. In the infancy of pathology physicians regarded phlegmonous abscess of the lung as a common and ordinary occurrence, but it is extremely rare ; and Laënnec, when he published the first edition of his work, had only met with six cases, notwithstanding all his extensive research ; and in the practice of every other physician phlegmonous abscess of the lung is equally uncommon. Abscess of the lung, although termed phlegmonous, to distinguish it from tubercular abscess, generally exists without any great intensity of inflammation or other considerable alteration of its tissue.

Pneumonia may also terminate by gangrene, which is also as rare a termination as by abscess. It occasionally arises from excess of inflammation, but more commonly the inflammation which precedes this state is of little intensity, so that it rather approaches to anthrax, or pestilential bubo, and the inflammation around the gangrened portion appears to be the effect rather than the cause of the mortification. The gangrened portion may or may not be circumscribed, and is found in the different states of gangrenous eschar, of deliquescence, of sphacelus, and lastly of simple excavation, the gangrened portion having been detached and escaped.

The frequency with which these different forms of inflammation occur is not yet estimated, but is probably in the inverse order of their intensity, the diffuse inflammation being the most frequent, then the serous, the adhesive, the purulent, and lastly the gangrenous.

Pneumonia may be either single or double,—that is, it may attack one or both lungs at the same time. Thus, out of 210 reported cases, 121 were on the right side, 58 left side, and 25 double, while the seats of 6 were unknown. Of the part of the lung attacked, out of 80 cases of pneumonia 47 consisted of inflammation of the inferior lobe, 30 of the superior lobe, while 11 times the whole lung was inflamed.

Bronchitis may take place without pneumonia, but in many cases pneumonia follows as a consequence. Pneumonia also may take place without bronchitis, but in general bronchitis accompanies it. Pneumonia also may take place without pleuritis, but it generally happens that the pleura is more or less affected.

Much speculation has been entertained with respect to the more particular seat of pneumonia, some contending the inflammation affects the cellular tissue of the lung, and others the air-cells, others both. It is quite certain, however, that the minute bronchial tubes are not affected in slight pneumonia, for in such cases their divided extremities stand out in the midst of the inflamed part like so many white points. When the lung is more acutely inflamed the bronchial tubes are red, and evidently greatly inflamed. It has been stated that chronic pneumonia is supposed by many writers not to exist.

Besides being subject to inflammation, the lung may be hypertrophied. Thus Laënnec observed a great number of cases in which one lung being no longer able to fulfil its functions from effusion of air or fluid into the cavity of the chest, that the healthy lung acquired a volume manifestly greater than normal, its tissue being more dense and compact, so that it did not collapse on opening the chest, and more resembled the lung of a child or of a horse. This hypertrophy may take place in no very long time. Laënnec, for example, found this alteration in a man who, six months before, had suffered from a pleuritic attack, in consequence of which the lung on the diseased side became atrophied, and the chest deformed. This alteration is the result of the law, if one of a double organ becomes atrophied, or incapable of performing its functions, the other becomes the seat of greater nutrition and more active function.

The lung may likewise be atrophied, a condition common to old age, when it becomes of less volume, contains less blood, and is of a remarkable lightness. In other cases the atrophy is the result of disease, as after collapse from empyema, when the lung is often little larger than the fist, without any trace either of bronchi, of cells, or of cartilages.

The sole entozoaires which have as yet been met with in the substance of the lung are acephalocysts; and Andral has seen one entire lobe transformed into one vast hydatid cyst. In another case he found a collection of hydatids in the interior of a considerably dilated pulmonary vein. A recent instance of hydatids of the lung is also given in the *Bulletin de l'Académie Royale*. These parasites, however, though common in animals, are happily rare in man. The lung has also been found the seat of steatoma. Thus Sir Astley Cooper stated, that he found the lungs of his late Majesty, George the Fourth, loaded with fat. The substance of the lungs is also occasionally the seat of ossific deposits, and portions of evidently ossified cellular tissue have often been expectorated.

Pathology of Pleuritis.—The pleura is the membrane covering the lungs, as well as lining the cavity of the chest, and is liable to all the inflammations incident to other serous membranes, or to the diffuse, the serous, the adhesive, the suppurative, the ulcerative, and to the gangrenous, and these may be either acute or chronic.

The diffuse inflammation begins in the sub-pleural tissue, whose vessels enlarge and admit red blood, and shortly afterwards the red blood penetrates the web of the pleura itself. At first a number of red dots or punctures are seen, which at length are so multiplied as to become confluent and form large patches, which spread till perhaps the whole of the pleura pulmonalis and costalis is one continued inflammation. The membrane is in all cases of a bright red or arterial colour, slightly thickened from interstitial deposit, and easily detached from the now increased lacerability of the subcellular tissue.

If the diffuse inflammation be of any intensity, the secretion from its surface is in general suspended, and the membrane is dry. In this state the inflammation may terminate by resolution, or serum may be poured out, causing *serous inflammation.*

The quantity of serum effused is very various, in some cases hardly exceeding a very few ounces, while in other cases it amounts to many pints, filling that cavity of the chest which is the seat of inflammation. Laënnec is of opinion that the time of effusion after the commencement of the inflammation is often very short, as he has detected ægophony and absence of respiration, as well as of thoracic resonance, an hour after the patient has first felt pain in the side, or "le point de côté." If the effusion be considerable the lung becomes collapsed, contains no air, and therefore no longer crepitates; the vessels are devoid of blood, while the bronchi, even to the large trunks, are evidently contracted; still, if this lung be inflated it enlarges more or less perfectly. Again, should the pleuritic effusion be less in quantity, some fluid appears spread all over the lung; but the greater quantity is always collected at the lowest portions of the chest.

Accompanying either of the previous forms, or else existing *per se*, lymph may be thrown out, and adhesive inflammation be set up. In many cases the lymph thrown out is loose and watery, sometimes only rendering the serum turbid or flocculent; but in other cases it is more solid, and adheres with great tenacity to the opposite membrane, and becomes organized at both surfaces. The organization of these membranes is rapid, and is often effected by the end of 24 to 48 hours. If the patient falls shortly after an attack of acute inflammation, these adhesions are found soft, easily lacerable and extensible, and in this state are perhaps sometimes absorbed. If, however, he survive a longer period, the adhesions are often of great tenacity, are indurated, and with difficulty separated from their attachments. The extent of membrane affected with adhesions is very varied, sometimes limited to a small portion, and sometimes extending over the whole cavity, but their most common seat is generally the anterior lobes, or the portion from the mammæ to the axillæ.

The pleuritic inflammation sometimes terminates in suppuration; and should the pus be in such quantity as to accumulate in the cavity of the chest, the disease is termed *empyema*. Empyema may be true or false: it is said to be true when the pus is secreted by the pleura, and false when it results from the bursting of an abscess of the lung into the cavity of the chest. The quality of the pus in true empyema varies from a genuine laudable pus to a sero-purulent fluid. In quantity also it varies from a few ounces to many quarts, filling the entire cavity of the chest. Under these latter circumstances the side of the chest is dilated, and the intercostal spaces widely separated and bulging.

Effusion of pus may take place into either cavity of the chest, but the left perhaps is the most common; at least three cases have been observed in St. Thomas's to one on the right. The phenomena accompanying empyema of the left side are remarkable; for, besides the lung being found collapsed, not so big as the fist, and often without a trace of bronchi or of bronchial cartilage, the heart is sometimes seen transposed as far over on the left side as it usually is on the right. Under these extraordinary circumstances, if we examine the chests of these patients after death, if paracentesis has not been performed, the heart is found to return to its natural position in proportion as the pus flows, showing that it is rarely fixed in its new situation by adhesions. In other cases, however, in which paracentesis has been performed, and the pus has been drawn off, the heart is found in its place, while the lung, less completely collapsed, is bound down to the upper and lower portion of the chest by long and multiplied adhesions, which entangle large quantities of pus, and are perhaps the cause of the ultimate fall of the patient.

Such are the red or chromatous inflammations of the pleura, but it is also the seat of many achromatous inflammations. Thus large quantities of pus, extensive adhesions, or a great excess of serum has been often found in the chest, and yet the patient has not suffered any pain during life, neither can a red vessel be traced after death. The adhesions which thus form often give rise to many singular phenomena: their tenacity is notorious, the lung constantly tearing without their yielding, while they are sometimes so extensive as to bind that organ throughout all its extent to the ribs, and limit its play to the mere rising and falling of the chest. They also, like all newly-formed abnormal parts, readily run into disease; and hence we often find them the seat of serous or purulent effusions, forming a partial hydrothorax or a partial empyema. The pleura also sometimes becomes the seat of ossific deposits. Laënnec has seen it converted into a fibro-cartilage, Dr. Baillie into a plate of bone; and in the Museum of St. Thomas's

Hospital there is a specimen of a bony pleura, occupying almost half the chest, and fixing the ribs, so that it is remarkable how life could have been continued with so extensive a disease. Hydatids have also occasionally been found in the cavity of the chest.

Symptoms of Pneumonitis.—Pneumonitis is determined to exist by two classes of phenomena, or by the general and physiological symptoms, and also by certain mechanical phenomena arising out of the physical structure of the lungs and of the chest. It will be better first to describe the general and other symptoms, and then the phenomena arising from percussion and auscultation.

General Symptoms of Bronchitis. — Bronchitis, of whatever kind, is often preceded with fever, more commonly by symptoms of a common cold; but it also often commences without any previous illness; in whichever way, however, it begins, the hoarse altered voice, the cough, and expectoration, are too palpable to allow us to mistake the nature and existence of the disease. In a very few instances of diffuse inflammation the cough is dry and without expectoration, but far more generally it is accompanied by sputa; the sputa vary greatly according to the different degrees of inflammation, or according as that inflammation is acute or chronic, sthenic or asthenic. In acute cases it is at first a thin mucus streaked with blood, then more opaque, and lastly purulent; in more chronic cases it may be merely a muciform saliva, or a gelatiniform mass, or it may be like the unboiled white of egg, so tenacious that it may be poured from one vessel into another without separating. In other instances it is puriform, varying from a laudable pus to a red or green æruginous putrilage. When purulent it is usually formed into sputa, but in a few cases it is thrown up in large quantities unmixed, as from an abscess. The quantity of matter expectorated also varies greatly; sometimes only a few sputa in the morning, at others half a pint or a pint in the 24 hours, while other patients actually die suffocated from the immense quantity which is suddenly poured out.

The cough is seldom accompanied by any pain in the inflamed membrane, and has many degrees of violence. It may occur in paroxysms, and the sputa be discharged after a violent effort, at night, or in the morning, or at other definite intervals. Again, it may be incessant, harassing the patient at every instant, causing a sense of soreness or constriction of the chest, and sometimes severe pain at the ensiform cartilage, in consequence of the mechanical exertion of coughing.

With respect to the effects of the cough on the constitution, the patient, supposing the disease to be unconnected with any morbid poison or organic affection of the substance of the lung, suffers little in his general health, and would be well if he could get rid of "the cough." In other cases he loses flesh, throwing up every meal from the violence of the cough, while in others he sinks into a state of marasmus simulating phthisis. His pulse is generally natural, although in some cases it is frequent; his bowels also are regular. In bad cases, however, the patient's nights are broken, but he sleeps towards morning while in slighter cases he sleeps through the night but is disturbed in the morning.

The duration of this affection is very various: sometimes it terminates in a few hours, sometimes in a few days, ceasing with the cold that produced it. In other cases its duration is long, and it is with difficulty recovered from, and thus often lays the foundation of phthisis or other formidable disease, which ultimately destroys the patient. In old persons it generally returns every winter, or lasts, with intermissions, the whole year.

General Symptoms of Pneumonia.—Pneumonia is generally preceded by some antecedent fever, or by shivering more or less violent, and often by bronchitis. In a few cases, however, it is the primary affection.

The disease being set up, the patient is restless and uneasy; his respiration difficult and hurried, or from 30 to 50 in a minute; his cough frequent, and his expectoration streaked with blood; but notwithstanding this symptom he seldom, unless the pleura is affected, suffers pain; and hence the adage that in pneumonia there is "plusquam periculi quam doloris." His pulse is full and frequent, or from 100 to 120; his countenance livid; his nostrils dilated; his tongue purple, and coated with a white or yellow mucus, while he lies on his back supported by pillows. If the patient recovers, these symptoms are gradually mitigated; but should he fall his tongue becomes brown and typhoid, his pulse more rapid, profuse sweats break out all over his body, and at length his mind wanders, and he dies comatose, or half asphyxiated. There are many instances, however, where the course is widely different, and in which the patient, though evidently distressed by impeded respiration, has yet moments of cheerfulness; gets up; walks about the ward; but dies during the day, seized with a severe paroxysm of dyspnœa or of coughing.

Such are the general symptoms of pneumonia; and, except by their different degrees of intensity, it is difficult to distinguish the different forms of inflammation from each other without the application of the stethescope. The general symptoms of serous pneumonia, however, are the most marked; the uneasiness being greater, the respiration louder and more difficult; the countenance more livid and swollen, the cough more harassing, the expectoration more abundant, and the attempt to lie down impossible. A gangrenous state of the lung is determined by the intolerable fœtor of the breath.

The duration of pneumonia is very various. Laënnec conceives the diffuse inflammation to last seven or eight days—Andral, red hepatization to last 15 to 20 days; while grey hepatization, when an original disease, is supposed to destroy the patient in 24 or 36 hours from the first symptom of attack. More generally, however, taking all its forms, pneumonia terminates between the seventh and the twentieth day.

General Symptoms of Pleuritis.—Pleurisy, like other inflammations of the lungs, may be acute or chronic. The acute form of this disease may be preceded by fever, but often no such antecedent is present. Its local symptoms, however, in most cases, are strongly marked; the patient suffering with severe continued *pain* in the affected side, which is greatly exasperated by coughing, or other forced inspiration, so that the chest can only be half filled with air. The seat of the pain, however extensive the inflammation, is generally limited to one point, termed the "point de côté," and this point is generally about the centre of the mamma, or just below that part. The tongue is commonly white, but the pulse varies perhaps according to the form of the inflammation and its intensity; or, if the disease be limited to an effusion of lymph or serum, the pulse is seldom more than 90 to 110; and either form of pleuritis is also generally accompanied by a short troublesome cough, and some expectoration. The patient likewise is for the most part restless, and lies on the affected side. After effusion of serum has taken place, the pain is much mitigated; but if it be in any quantity the lung is compressed, which increases the general uneasiness, as well as the oppression of the breathing, and the patient, instead of lying on his side, now lies on his back, or else sits propped up in bed. If he recovers, the fluid effused is absorbed, with greater or less rapidity, and his amendment is proportionably retarded or accelerated. In fatal cases, although the lung may for a time become accustomed to the altered state of things in the chest, yet fresh effusions occur, and shortly terminate the life of the patient.

Again, if the inflammation is about to terminate by effusion of pus, the pulse is extremely small and frequent, or from 120 to 150, while the restlessness and anxiety of the patient is greatly increased. It is strange, however, that there are cases of empyema, in which the patient suffers little pain, or any more marked symptom than usually awaits the last stages of phthisis. In some instances he is for a time even capable of walking about the ward. Supposing, however, the empyema to have formed, any acute pain the patient may have suffered subsides, but the anxiety of the patient is increased, and his state of collapse shows his imminent danger. On the contrary, if the constitution be less affected, the symptoms vary according to the side of the chest which is the seat of the empyema. If it be on the left side, for example, the heart is often transposed, and felt beating as far over on the right side as it usually does on the left, and the pulse is small and frequent. If we now bare the chest of the patient, we find the affected side enlarged, sometimes œdematous, with projecting intercostal spaces. As the lung is now greatly compressed, no respiratory action is seen on that side, which is entirely at rest. If an operation be now performed, the heart is restored to its place as the pus flows; but as the lung for the most part only imperfectly expands, the affected side, even in the most favourable cases, contracts, and the spinal column, pressed upon by an unequal weight, acquires a lateral curvature; the shoulder sinks, and the patient is greatly and permanently deformed.

The duration of acute pleurisy is very various, sometimes terminating in a few hours, sometimes in a week or ten days, while Laënnec has met with cases in which many months have elapsed before the pleuritic effusion has been absorbed, and the patient restored to health.

Such is a short account of the physiological symptoms which mark pneumonitis; and it will now be necessary to add those physical symptoms which render the seat of the disease, as well as its nature, more definite and precise.

Physical Symptoms of Pneumonitis.—On striking the chest of a person in health, it returns, like a half-filled cask, a certain hollow sound, demonstrating it to be partly filled with air. Also, if we place the ear to the chest, we hear certain sounds on inspiration and on expiration, which are termed the respiratory bruit or sound. In disease these natural sounds are altered, the sound on percussion being rendered duller or clearer than natural, while the bronchial respiration undergoes still more remarkable alterations; and these modifications frequently enable us to determine the nature and seat of the disease.

Physical Symptoms of Bronchitis.—The natural and healthy respiratory bruit of an adult has been compared to the sweet sleep of a healthy child; but in bronchitis this sound is changed, and varies in different cases, from a tolerably sharp sound, which, when multiplied from a number of bronchi being similarly diseased, resembles the chirping of a nest of young birds, to the bass note of the violoncello, and consequently embraces a musical scale of considerable compass; the principal and more marked division of which, Laënnec has termed " râle sonore ou renflement," " râle siffilant sec ou sifflement, râle tourterelle, and râle musicale." The cause of the higher notes has been supposed to be owing to a thickening of the mucous membrane at the orifices of the various bronchial tubes, so that the natural embouchure is narrowed, and a musical wind instrument thus formed. To those who have observed in the dead body a swollen state of the bronchial membrane, this explanation may seem satisfactory; but to those who deny the existence of any such phenomenon, it seems more easy to explain this morbid sound by different degrees of contraction of the circular and longitudinal fibres of the bronchi, in the same manner as we observe contraction of the muscular fibres of the œsophagus, or of the small intestines, causing stricture. The general law, also, that the orifices of parts are more often diseased than their more central portions, explains why this contraction should take place principally at the orifices of the bronchi, and hence the shrill piping or chirping sounds so often heard.

Laënnec has left the grave sounds entirely unexplained; and these are caused probably by an opposite state of parts, or by a relaxation both of the circular as well as of the longitudinal fibres, so that the bronchial tube is more open, elongated, and inflexible; and hence its vibrations are consequently longer, and the note more grave.

Besides the alteration of tone in bronchitis, its quality is also often affected by the presence of liquid matters within the cavity of the bronchi, and hence we have it interrupted and modified by the air passing through bubbles of mucus; and as the size of these bubbles and their viscidity vary, so the sound varies; and hence a scale has been established by Laënnec, whose extremes are the " râle muqueux," and the râle tracheal; the former representing the bursting of small slightly viscid bubbles; the latter larger ones of greater tenacity, and like those formed in gurgling. Sometimes this mucus, instead of being fluid, hardens so as occasionally to adhere and play as a valve, giving rise to a clicking noise, which has been termed by Laënnec, " bruit de soupape." These are the various morbid sounds heard in bronchitis; and the danger of this disease is denoted by the quantity of fluid effused, and by the gravity of the sound. The sharp chirping sound, as it denotes contraction, and consequently power, is less to be feared than the graver and deeper notes caused by relaxation, and consequently *loss* of power, and which shows that the air circulates with great difficulty in the bronchial cells. There is also another râle, which perhaps should be mentioned in connexion with bronchitis, or the " râle crepitant à grosses bulles ou craquement," which Laënnec compares to the blowing of air into a dried bladder, and is the pathognomic sign of rupture of the air-cells, and of penetration of air into the cellular tissue of the lung itself. In addition to the alteration of the tone in bronchitis, some indication may be drawn, according as the times of expiration are prolonged. In health the times of inspiration are much longer than those of expiration; but, in disease, these times are often equal, and, in some instances, that of expiration is longer than that of inspiration. This change is also a proof of severe bronchial inflammation.

Percussion generally returns a healthy sound in bronchitis. It may however happen, when the lung is acting irregularly, that a number of counter-currents may cause it to return a dull sound, like a glass of champagne while the wine is still effervescing.

The Physical Symptoms of Pneumonia vary in proportion to the intensity of the inflammation, and the consequences it produces. Diffuse inflammation is determined by a râle termed "crepitant." This bruit evidently takes place in the pulmonary tissue, and is compared by Laënnec to the crackling of salt thrown upon the fire, or to air blown into a dried bladder, or to the crepitation of the healthy lung when pressed between the fingers. The cause of this râle is variously interpreted, some pathologists attributing it to the dryness which sometimes accompanies diffuse inflammation, while others attribute it to bubbles of air breaking in a fluid of something of greater density than water, and secreted in the cells of the inflamed part; crepitation, however, is rarely distinctly heard.

If the pneumonia assumes the character of serous inflammation, it is quite singular how loud a mucous rattle is heard; it resembles a loud roaring rather than crepitation, and is supposed to be caused by bubbles of air breaking through a mass of slightly viscid fluid. This phenomenon is one of the most remarkable connected with disease of the lung. In both the preceding forms of inflammation the chest on percussion returns in every part a clear sound, the air still penetrating every part of the lung. If a dull sound is returned, it is on account of counter-currents.

Should the pneumonia proceed, and red or grey hepatization take place, the lung is solidified, and the bronchial tubes being either temporarily or permanently obliterated, no air penetrates the diseased portion, whence it follows that not only is the respiratory bruit lost, but also that the chest at this part will return a dull sound on percussion. These are the conclusions from theory; but it is seldom, unless the disease be very extensive, that these conditions can be satisfactorily established; for the noise of the surrounding bronchitis, and the supplemental bruit of other portions of the lung almost entirely mask the absence of respiration in the affected portion. Again, if the hepatization be central, the air in the more superficial portions of the lung often prevents a dull sound from being returned on percussion. In this difficulty, however, there is one symptom which greatly assists our diagnosis, or *bronchophony*. When the lung is hepatized or solidified, it has necessarily become a better conductor of sound, so that the voice, instead of being destroyed in the chest, as in the healthy lung, is now conducted downwards. In this altered state of parts, if the stethescope is applied to the chest, and the patient directed to talk, his voice is distinctly heard in the chest, and at the end of the stethescope, but without passing through it. This phenomenon is termed bronchophony.

Pneumonia, it has been stated, sometimes, though rarely, terminates in abscess. The physical symptoms previously to the bursting of the abscess are those of hepatization; but supposing the abscess to have burst into the bronchial tubes, the pus of course escapes, and a cavity filled with air is left communicating with the bronchial tubes, and this new state of parts gives rise to a new series of phenomena. The air, for instance, having penetrated into the cavity, the part which returned a dull sound, while the abscess was yet unbroken, will now return a sharper and clearer sound on percussion than natural, denoting a larger admission of air than even in health. Again, on auscultating the chest, we find some changes have taken place both in respiration and in the transmission of the voice. If the cavity, for example, be large and the opening small, the natural respiratory bruit at that part will be superseded by a sound resembling a person blowing into a decanter, and from this circumstance termed, by Laënnec, "râle amphorique," or "bottle sound."

Again, if the cavity be large and its walls dense, and the abscess still contains some pus, we hear a sound as if a drop of water had fallen into a pool; and this sound is so sharp and metallic, that it has received from Laënnec the term "tintement metallique," or metallic tinkling. It is usually supposed that this sound is produced by a globule of pus dropping from above into the fluid below; but some pathologists are inclined to believe that it is owing to the bursting of a bubble of air, mixed with the pus of the abscess. Another phenomenon is, if the abscess be large, and contain some pus, that, on the patient coughing, we actually hear the "wabbling" of the pus against the walls of the abscess. The last of these singular circumstances developed by auscultation is, if a large abscess be situated at the superficies of the lung, and the walls of that abscess be thin and not adherent, the auscultator has the disagreeable sensation of somebody sucking air out of his ear at the end of the stethescope, and this has been termed by Laënnec "souffle voilé." This striking symptom enables us to determine not only that there is an abscess, but that abscess is superficial, and its external wall not adherent; so we may affirm, if other symptoms indicate the presence of an abscess, and this symptom be absent, that the abscess must be deep-seated, or, if superficial, must be adherent.

The next remarkable circumstance revealed by auscultation in the event of an abscess is *pectoriloquy*, which is, that on the stethescope being applied to the chest, and the patient desired to talk, we hear his voice as if he were directly speaking at the end of the stethescope, the sound passing directly to the ear as through an ear-trumpet. This phenomenon results from the same cause as that which makes the aneurismal sac pulsate stronger than the healthy artery itself; or supposing the capacity of an artery to be as 6, and the aneurismal sac as 12, and the moving force as 3, the artery will pulsate with a force equal only to 18, while the sac will pulsate with a force equal to 36. In like manner, the vibration of air will be so much stronger in the empty cavity of an abscess as the cavity itself is larger than the bronchial tube; and hence this greater vibration of air is powerful enough to occasion a distinct vibration of the walls of the stethescope, and consequently a direct transmission of the voice to the ear.

Pectoriloquy, however, does not take place in all cases of abscess of the lung, but may be considered the exception rather than the rule of this disease. The cause of this is, that many conditions are necessary to its existence; first, that the lung must be condensed so as to have some conducting power, or else the voice will be destroyed, as in health, before it reaches the aperture communicating with the abscess. Again, it is necessary that the patient should have a sufficient quantity of voice to produce strong vibration; but this is often wanting. Another condition is, that the bronchial opening of the abscess be not too large, for in that case the vibrating force is diminished, and instead of representing a power of three to a square inch, it will now perhaps be reduced to a power of one to a square inch. It is likewise injurious to the effect that there be more than one opening into the abscess; for in that case not only is the vibrating force diminished, but the counter-currents destroy all vibration, as has been instanced in an effervescing glass of champagne. It is plain also that the walls of the abscess must have a certain density, or else their flaccidity will act like a damper, and destroy all vibration. Many conditions, therefore, are necessary to pectoriloquy; and we cannot feel surprised that one or more may be wanting, and the phenomenon in question frequently absent.

Besides an opening into the bronchial tube, the abscess may at the same time open into the cavity of the chest, producing what has been termed a triple opening, and this new pathological state gives rise to a tintement métallique of the chest infinitely more powerful than that caused by a pulmonary abscess. Indeed the intensity and sharpness of the sound quite equals that returned by a copper vessel when struck with a slight force; for the intercostal muscles, irritated by the air and pus in the pleural cavity, brace the walls of the chest like a drum, so that they become an excellent conductor of sound. The immediate cause of the sound is supposed to be exactly the same as when it results from an abscess, either a drop of fluid falling into the pus below, or else the extrication of a bubble of air from the gravitated pus. The chest in these cases always returns a remarkably clear sound on percussion.

In *Pleuritis*, auscultation and percussion are equally valuable in determining the amount of effusion, and sometimes the nature of the effusion. If serum or pus be effused to the amount of a pint, the lung is displaced to that extent; and consequently the lower portion of the chest, when struck, returns a dull sound, which extends as high as the level of the fluid. If we now auscultate the patient, the respiration is also lost below the level of the fluid. Besides these results, the voice gives very striking indications of the lung becoming condensed from the presence of the fluids; for we very constantly have bronchophony, and occasionally ægophony. In the latter case the voice, instead of being articulated, as in bronchophony, is broken, vibratory, and inarticulate, so that it has been compared to the bleating of a goat, or to the nasal vibratory notes of Punch, and hence it has been termed by Laënnec *ægophony*. This symptom has been supposed to be caused by oscillation of the fluids in the chest incessantly altering the diameter of the bronchial tubes of the compressed lung.

When the effusion is so considerable as to form empyema, and the cavity of the chest be only partly filled, we sometimes have, as in a case now in St. Thomas's Hospital, a tintement métallique. It has been thought that a triple opening was in all cases necessary for the production of this sound, but in the patient alluded to there was no reason whatever to suspect abscess of the lung. In a similar case that died some years ago in the same hospital, although the tintement métallique was most marked and complete, yet on examining the patient no air passed from the lung into the chest, even when the lung was inflated after the cavity of the chest had been filled with water, neither could any trace of an abscess or of an ulcer of the lung be found. The presence of air is perhaps necessary to this phenomenon, but this may be generated by putrefaction, or be extricated by secretion, and consequently a communication with the external air is not essential.

If the chest be completely filled in empyema, the respiratory sound is altogether wanting; so is ægophony and bronchophony, and the containing cavity returns a dull sound at whatever part percussed. Under these circumstances, and especially if the heart be transposed, the patient should be undressed, when the affected side will be seen entirely motionless, rounded, and distended; and when these signs are present there can be no doubt of the disease being either empyema or hydrothorax.

Besides pus being effused into the chest, lymph may be thrown out in a more or less solid state; and this morbid result gives a rubbing sound, as though the play of the lung was impeded by a rough uneven surface. Such are the physical symptoms accompanying pneumonitis.

Diagnosis.—It is hardly possible to confound bronchitis with any other disease; but there is often much difficulty in assigning its cause, and distinguishing it from phthisis. The quietness of the pulse, however, the absence of great emaciation, and the clear resonance returned on striking the chest, are the best diagnostic symptoms. Pneumonia is distinguished from phthisis by the previous good health of the patient, and by the more acute nature of the disease; and, in some degree, by a difference of its seat, the lower lobes being more particularly affected in inflammation, the upper lobes in phthisis. The two diseases, however, it should be remembered, are often combined. Pleurisy is distinguished from the other forms of pneumonitis by pain, and by the very distinct evidence of effusion afforded by auscultation and percussion.

Prognosis.—Bronchitis is not often fatal in young persons, unless it is connected with phthisis. In the aged, however, it is often combined with disease of the heart or other affection, and is often fatal. Chomel says, he lost 40 cases out of 123 in one instance, and 38 out of 96 cases in another. It is supposed that one in three die when attacked with pneumonia or pleuro-pneumonia. Louis lost 28 out of 78; but this varies greatly in different years. A large proportion of those attacked by pleurisy recover, but the numbers are not determined. Andral observes, that pneumonia of the superior lobe is more grave than pneumonia of the inferior lobe, and this arises from two causes; first, in the young the superior lobe is often previously diseased, while, according to Louis, pneumonia of the superior lobe is one of the contingencies of old age.

Treatment.—The treatment of all the forms of pneumonitis varies according as the disease is acute or chronic, and according as it depends on simple inflammation, or on a morbid poison, conditions which it is often extremely difficult, sometimes impossible, to determine, and which consequently greatly embarrass our practice.

Abundant experience has shown that large bleeding in acute *bronchitis* uniformly weakens the patient without greatly influencing the disease. Neither has medicine any very marked effects in the cure of this disease; for although some persons rapidly get well under a given treatment, yet many other similar cases, under exactly the same treatment, will run on for weeks, and perhaps for months, without any amendment. In the most acute cases of bronchitis, however, some blood should be taken from the chest either by cupping or leeches, and in general 10 to 12 ounces are sufficient; and in acute cases the quantity of fibrine of the blood is increased from 3 to 6, 7 and 9. After this a blister should be applied to the chest, and, on its being removed, a large linseed poultice should be placed over the blistered part, and continued for many hours, which will not only keep the ulcerated surface open, but gratefully foment and relieve the patient. In the medical treatment, some opiate after the bleeding is necessary to allay the cough; and any preparation of opium, as extracti opii or morphine, or else the syrup of poppies, or of any other narcotic, as of hyoscyamus, or of conii, should be given in moderate doses, every four or every six hours. It is usual also to add to each dose a grain of ipecacuanha, or $\frac{1}{4}$ of a grain of antimonii c. potassio tartarizati, or else some neutral salt, as the liquor. ammoniæ acetatis, ℥ ſs., or the magnesiæ sulphatis ʒ j., according to the state of the bowels. In a few instances, small doses of mercury are beneficial.

In chronic cases of bronchitis the blood is found to be natural in its proportions. After blistering, and perhaps poulticing the chest, the treatment is in general more tonic; as the mist. cascarillæ ter die, or the infus. rosæ c. oxymellis scillæ ʒ ſs. c. tinct. hyoscyami ♏ xv. ter die. Ten grains of benzoic acid out of mist. amygdalæ is another useful remedy, and the mist. ammoniaci or the mist. assafœtidæ are often beneficially employed. If the cough be greatly troublesome syr. papaveris ʒ j., or confectio rosæ may be given almost *ad libitum*.

The treatment of *Pneumonia* is one of the most discordant points of medicine. Most practitioners, finding the blood well buffed and the fibrine increased to five, six, seven, eight, and nine parts, instead of three, treat it by large bleedings; while Laënnec and Louis seem to deduce from their experience that large bleedings are by no means an eminently successful practice, and that in some cases they are absolutely injurious; and the same difference of opinion is held with respect to large doses of antimonii c. potassio tartarizati. These discrepancies are painful, and can only be explained by the circumstance that pneumonia perhaps more frequently depends on the action of a morbid poison than is generally believed.

The ancients bled in pneumonia, and sometimes to deliquium, and Galen appears to have adopted this practice. This was also the practice of Sydenham; and Laënnec says it was common in France at the beginning of the last century to take 24, 30, and 36 ounces of blood at one bleeding. This practice is, within certain limits, followed throughout Europe at the present day, and there can be no question of its propriety in some cases of simple inflammatory pneumonia; but it appears to be a great error to make excessive bleeding the basis of the cure in all cases.

In epidemic pneumonia, says Laënnec, it is hardly possible to bleed the patient without rendering him worse. In 1814 pneumonia was very common among the conscripts, yet there were few indications for bleeding, and those that were bled were rendered so much worse that, says Laënnec, "Je n'osai pas la réitérer." It is probable under similar circumstances that Louis bled, and was equally dissatisfied with the result he obtained. It will be plain, then, that with respect to bleeding, much must be left to the discretion of the practitioner. That there are cases in which the patient can only be saved by energetic bleedings everybody must admit, while, on the contrary, when pneumonia is epidemic the quantity of blood drawn must be greatly limited and the case well watched. The ancients held that bleeding should not be practised after the fifth day, as it prevented *concoction*. The cases of Louis appear to establish the propriety of early bleeding as a general rule; for he says those bled in the four first days of the affection are cured four or five days sooner than those who are bled later in the disease.

It is rare that the cure of pneumonia is left entirely to the influence of bleeding. Rivière used to treat pneumonia by giving the patient an emetic every day or every other day, a practice which has at all times had many partisans. Senac being told by his son that he bled too little and gave too many emetics in pneumonia, abandoned his own plan, but with so little success, that he exclaimed one day, "You have made me a worse physician than I was before." We owe to Rasori the introduction, in modern times, of large doses of emetic-tartar in the treatment of pneumonia. Laënnec was so dissatisfied with his own results of bleeding that he adopted it, and thus describes his practice:—

"As soon as the disease is determined, if the patient be in a state to bear bleeding, I take from eight to sixteen ounces of blood from the arm. I do this as momentarily arresting the inflammation, and thus giving the tartar-emetic time to act, and I rarely repeat this bleeding. Immediately after this bleeding I give the first dose of tartar-emetic, or a grain in two ounces and a half of orange-flower water, and I repeat this dose every two hours for six times; I then allow the patient to repose for six or seven hours. If, however, the disease be severe and the oppression great, I continue it every two hours till the symptoms are mitigated, increasing the dose from one to two grains, or even to two grains and a half. The immediate effects of this practice were, that the larger number of patients vomited two or three times, and had five or six stools on the first day, but afterwards the evacuations were trifling, and when tolerance was established they often required purgative medicines, while many bore these large doses almost without vomiting or experiencing any purgative effect. The result was, that Laënnec cured 27 cases out of 28 in 1824 and in 1826.

The great success obtained by Laënnec appears, however, to have been of short continuance, for M. Lagarde has published an account of 16 cases treated by Laënnec by this method, of whom 5 died, while Lecoultrenx has given a list of 30 cases, likewise treated by Laënnec, and of whom 12 died. Neither have other physicians in other years been more fortunate, for Louis treated 15 cases according to this method, and 6 died; Chomel, 140 cases, and 40 died; while Gueneau de Mussy treated 90 cases, of whom 38 died. Andral has likewise treated a considerable number of cases of pneumonia by tartar-emetic, in quantities varying from 6 to 32 grains in the 24 hours; and he adds, I have seen but two unpleasant or grave accidents result from these large doses. Sometimes the patient has not been at all affected, has neither had nausea, vomiting, or diarrhœa, or abdominal pains; at others he has suffered from nausea and distressing vomiting, effects which have subsided on omitting the medicine. Tartar-emetic, he adds, may therefore be given with impunity. But is it useful? I have not, he adds, seen pneumonia ameliorated by large doses of this medicine; for neither has it appeared to do good when borne by the stomach, nor when it has excited distressing nausea and vomiting. Bouillaud rejects it altogether, and prefers large bleedings, by which means, he says, he recovered 90 patients, and lost but 12.

Having thus stated the practice of these eminent physicians, it only remains to add our own opinions of the best mode of treating pneumonia. The quantity of blood drawn varies greatly according to the season; in London, however, it is seldom necessary to take more than from 16 to 30 ounces of blood, and these, if the symptoms demand it, should be drawn as early in the disease as possible. It is seldom right, however, to trust to bleeding alone; and it has appeared to us that a combination of antimony and calomel has saved a much larger number of cases than antimony alone; a quarter of a grain, then, to a grain of antimonii c. potassio tartarizati, combined with one grain of calomel, given every four or every six hours, according to the severity of the disease, is by far the best treatment. In cases of simple serous pneumonia even simpler remedies are sufficient; and two grains of ipecacuanha given 6^{tis} vel 4^{tis} horis have frequently been followed by the recovery of the patient.

With respect to counter-irritation, the greater number of physicians, says Laënnec, regard blisters as next to bleeding in combating pneumonia; but I, he adds, rarely employ them, for they seldom appeared to cure the patient, while they too often seemed to augment the fever and the partial congestion; while Louis says blisters have no evident action in the cure of pneumonia.

The diet in pneumonia should be slops; the chamber kept warm, but not hot.

Treatment of Pleuritis.—In acute pleurisy the best practitioners of all times and of all countries have taken blood from the arm; and if, says Laënnec, after one or two bleedings the pain in the side and fever have not abated, blood should be taken from the side by leeches or by cupping. Cupping, he adds, is however much better than leeches, for it is more prompt, less painful, and we can take the exact quantity of blood we wish for. Leeches, on the contrary, are long in drawing and uncertain in the quantity they take, sometimes filling rapidly, and then again hardly biting; while in other instances the bites will cease to bleed as soon as the leech is off, while in others again they continue bleeding for 24 hours. The practitioner should remember that effusion often takes place after bleeding in consequence of a subsidence of the inflammation, so that the breathing is often more oppressed and the symptoms for a time aggravated, although the patient is in reality better. The lung, however, soon gets accustomed to this new state of things; and the fluid in a few hours beginning to be absorbed, the symptoms are now generally ameliorated.

Tartar-emetic, says Laënnec, is in general well supported in pleurisy, and contributes powerfully to assuage the inflammatory orgasm; but nevertheless, when the pain in the side and fever have ceased, it loses all further power over the disease, at least does not appear to promote the removal of the fluid effused, so that he always abandoned its use as soon as the acute symptoms had passed away.

With respect to the application of blisters, Laënnec objects to their use until the acute stage is passed; but when the pain has ceased for some days, and absorption of the fluid proceeds slowly, and the disease promises to become chronic, he now applies a blister. Louis says we may neglect them without any sensible inconvenience.

Such is the treatment recommended by Laënnec. There can be no question, however, after bleeding the patient from 10 to 20 ounces, according to the severity of the case, that calomel is a more powerful remedy than tartar-emetic, and that five grains of calomel, once, twice, or more times a day, often stops the inflammation, saves a great deal of blood, and often, indeed, the patient's life; and supposing effusion of serum to have taken place, it is the best absorbent we possess, especially when combined with the bitartrate of potash, neutral salts, or other diuretic.

Should empyema have taken place, and pus be effused to such an amount as to make it impossible to hope for its removal by absorption, the operation of paracentesis of the chest ought to be performed. Laënnec says the space between the fifth and sixth rib, counting from above downwards, should be selected,—being the most depending part of the chest when the patient lies on his left side, which must be considered his more usual position in this disease. When the chest is punctured the pus should be entirely evacuated; at least no advantage results to the patient from any portion of it being retained, for even when the heart is displaced no adhesions have yet been observed so strong as to prevent it resuming its place as the pus flows. After the pus has been drawn off, the great difficulties of the further treatment arise out of partial adhesions of the lungs preventing the escape of the matter, and consequently the closing of the wound. It may be questionable whether a probe ought not to be introduced to break down the attaching parts, and also whether injections of tepid water might not be used advantageously to bring away the putrid or thickened matters contained within the chest.

The diet of the patient while labouring under acute pleurisy should be slops; after, however, the operation of paracentesis of the chest he should have a liberal support of wine as well as of animal food.

Of Inflammation and other simple Organic Diseases of the Heart.

The anatomy as well as the pathology of the heart and large blood-vessels begins with Harvey; but the subject can hardly be said to have taken a scientific form till the beginning of the present century, when the work of Corvisart appeared, followed by that of Burns in England, of Testa in Italy, of Kreysig in Germany, and of Bertin and more especially that of Laënnec in France; and a large school has been since formed in Europe by the labours of these eminent pathologists.

The inflammations of the heart embrace Pericarditis, Carditis, and Endocarditis. 3788 cases are reported to have died of these diseases in England and Wales in the year 1839, a number evidently infinitely below the truth, and shows how imperfectly this class of disease is yet studied and known. The knowledge, indeed, of the profession generally respecting carditis and of pericarditis is too unsure, and our description of them consequently too desultory to allow us to treat of the inflammation of the heart in the same concise manner as we have done those of the lung, and compels us to describe each form of carditis under a separate head.

Of Pericarditis.

Pericarditis is an inflammation of the serous membrane containing and covering the heart *externally*. The total number of persons reported to have died of this disease in 1839 was 135, so that this affection is extremely rare.

Remote Causes.—The pericardium is acted upon by a few morbid poisons, as the paludal poison, perhaps the poison of the plague, of the small-pox, of scarlet fever, and of scurvy. The most common cause of pericarditis is the rheumatic or gouty virus; and the diseases of the pericardium arising from those causes will be treated of under the head of Rheumatism. The other causes are extremely undetermined, and perhaps are to be referred to general causes acting upon a peculiar idiosyncrasy; thus pericarditis is often connected with albuminous urine dropsy. In other cases it has appeared connected with powerful moral emotions; one lad died of this disease after receiving a good starting, but he might have been ill before.

Predisposing Causes.—All ages are perhaps liable to pericarditis; but it is scarcely known in infancy, and is only occasionally seen as a primary disease in children above six years of age. When it arises from albuminous urine dropsy, rheumatism, or the paludal poison, it is most common between 20 and 40. Men appear to suffer more than women, and nearly in the ratio of three to two.

Pathology.—The pericardium, like all other serous membranes, is liable to the diffuse, the serous, the adhesive, and to the purulent inflammations. These different degrees of inflammation may exist *per se*, but it sometimes happens that they all co-exist in different parts of this membrane at the same time. They may be acute or chronic.

If the patient falls from acute diffuse pericarditis, the inflamed portion is of a bright rose-colour. This redness is in the first instance caused by the increased vascularity of the subjacent cellular tissue; but as the disease advances red blood penetrates the serous membrane, first punctuating it with a number of dots, which become confluent, and form patches that extend till perhaps the whole membrane is one bright scarlet. Besides being red, the membrane is thickened, first from interstitial deposit, and then from incorporation with the sub-serous tissue; and it is now opaque, white, thickened, and readily detached from the heart.

The diffuse inflammation may terminate by resolution; but more commonly it passes into the serous inflammation, the quantity of serum effused varying from a few ounces to a few pints. Louis has given one case in which it amounted to four pounds, and Corvisart another in which the quantity was still more considerable.

The adhesive inflammation often co-exists with the preceding inflammation, and lymph is now thrown out, and generally in much greater quantity than from any other serous membrane. The lymph thus extravasated may be only in such quantity as to render the serum turbid, or else so extremely loose in texture as to float in it; more commonly, however, it is disposed as a membrane, often covering both surfaces of the pericardia, and especially that covering the heart, and often amounts from two to many lines in thickness. This mass, when considerable, presents a remarkably irregular appearance, and which has been compared to the stomach of a calf, to a portion of a honey-comb, or to two pieces of marble united by grease and forcibly separated. If the patient falls in the acute stage this membrane is found only slightly coherent, and very rarely exhibits any trace of organization.

The highest degree of acute inflammation is when pus is effused, which is generally of a laudable healthy character, though sometimes of a greenish hue. The quantity effused is very various, sometimes only a few ounces, but at others so abundant as to fill the pericardium.

In the chronic forms of the disease all the above morbid states may be observed; but when lymph has been effused it is now commonly found organized, so that the pericardium is often partially or universally adherent all over the heart. In some instances the lymph effused, instead of forming adhesions, becomes converted into cartilaginous and even osseous patches, which are readily detached from the surface of the heart by the scalpel; and in a few rare instances the connecting cellular tissue of the pericardium is so extensively ossified that the muscular walls of the heart have been partially or generally converted into one unyielding mass of bone.

The acute forms of pericarditis sometimes involve the muscular walls of the heart, so that on cutting through them the muscles are seen for a greater or less depth of a deeper colour than usual, and their texture is also impaired, the finger readily passing through them. In chronic inflammation, on the contrary, their colour is sometimes lighter than usual, and their texture firmer.

With respect to the relative frequency of the different forms of inflammation, Louis states he found the fluid effused altogether serous in nine cases, sero-sanguinolent in five, sero-purulent in 15 cases, and pure pus in seven cases; while false membrane or lymph was effused in greater or less quantity in nearly all the cases.

General Symptoms. — The symptoms of pericarditis vary, according to most authors, as the disease is the result of rheumatic or of simple inflammation; the symptoms in the former case being extremely well marked, while in the latter they are exceedingly obscure. They are both physiological and physical.

When pericarditis is the result of rheumatism, its most marked characteristic is pain more or less severe in the præcordial region; and from this point it radiates over the whole of the sternum, sometimes extending to the brachial plexus and down the left arm. This pain is accompanied by a sensation of the whole chest being constricted, and by an incapacity to take a long breath, or to cough. From these causes the patient is restless and anxious, his pulse varying from 90 to 110, full and strong, but often intermittent or otherwise irregular; and this state of things having lasted from three or four days to a week, the patient often dies suddenly, with or without his mind having previously wandered.

When acute pericarditis is the result of simple inflammation, the patient suffers no pain, and the symptoms are often most obscure, general as well as physical. Even when the disease is most unmixed, it has been mistaken for a common fever, for pleurisy, and even for uteritis. Its abrupt attack, its rapid course, the absence of local pain, and its sudden termination, hardly allow time to fix the seat of the disease. A few instances will best exemplify these assertions.

A sailor boy, who had a few days before received a good starting, was admitted into St. Bartholomew's Hospital. He made no complaint of pain, and he was supposed to labour under typhus fever. During the 36 hours he lived, he was many times sane and insane, and at one time he rushed to the window with an intention of throwing himself out, and then again sunk so low that wine was given to support him. His pulse was at one period rapid, as in the last stage of typhus, and then subsided to 90 or 100. He died, and the only disease was inflammation of the pericardium; lymph, pus, and serum being effused into its cavity.

A lady, says Mr. Burns, after a slight bowel complaint, miscarried. This was followed by vomiting, and the next day she complained of wandering pains on the right side of the chest. Two days afterwards she complained of headache, as well as of most excruciating pain of the pelvis, and the lochial discharge was almost entirely suppressed; she became delirious and died. On examination the uterus was found healthy, the lung of the right side where the pain was first felt was tuberculated, while the pericardium contained a quantity of flaky fluid resembling pus. Rostan thinks the symptoms of acute pericarditis, when not caused by rheumatism, are so obscure that its existence is only to be determined "per exclusionem," or by first determining what the disease is not, we may at length infer that it can be nothing else than pericarditis.

With respect to chronic pericarditis, we are in many instances at a loss to know what symptoms mark its commencement or attend its course. Laënnec says, he has frequently found the pericardium full of pus from chronic inflammation, without any symptom leading him to believe that any such disease existed. When the two pericardia adhere, the symptoms are also equally obscure. In most cases, if the disease be partial, little inconvenience is felt; and even when the adhesions are universal, the patient, though perhaps suffering from occasional palpitation and dyspnœa, yet more commonly falls from some remote disease, as dropsy or affection of the lung. In old adherent pericarditis it is generally supposed that the irritation caused by this morbid state of parts must produce a great flow of blood to the heart, and consequently that it must be enlarged and hypertrophied. It is doubtful, however, whether the fact corresponds with the theory, for many cases have been observed in which, when thus affected, the heart has been diminished in size and its cavities contracted.

The duration of acute pericarditis is from two or three days to two or three weeks. Chronic pericarditis may last many months, and often perhaps many years.

Physical Symptoms.—In the difficulty which exists in ascertaining the physiological characteristics of pericarditis, the mechanical functions of the heart afford some physical symptoms which are most useful in determining the existence of this disease as well as others of this organ. The intermittent action of the heart, for example, causes vibrations in its walls which give rise to two natural sounds, termed its bruits. These bruits are best heard when the heart beats about 60; when, however, its pulsations are more than 100, the sounds run more or less one into the other, and to most ears are now confounded. One of these sounds is short and clear, and is termed the *auricular* sound; the other is longer and duller, and is termed the *ventricular* sound. The cause of these sounds has been much debated by pathologists, some attributing them to the action of the valves, others to an active state of the muscles of the heart, both when it contracts and when it dilates, and others again to the circumstance of the blood passing from a larger into a smaller cavity, while Majendie conceives them to arise from the impulse of the heart against the ribs. It seems probable, however, that the causes of the heart's sounds must be multiplex; and as the rush of the water, the vibration of the cylinder, and the clicking of the sucker are united in the sound of pumping, so the rush of blood, the vibration of the heart's walls, and the play of the valves must all be concerned in the production of the sounds of the heart. Still, on whatever cause these sounds depend, they are liable to be much altered, and in 49 cases out of 50 these alterations denote a diseased state of the valves. Again, the heart knocks against the ribs, or has impulse; and this *impulsion*, when greater or less than natural, determines the walls of the heart to have an increased or diminished thickness. The impulsion also may be accompanied by a rubbing sound, termed "bruit de frottement;" and this is supposed to denote an effusion of lymph. Another condition of the heart is, that it moves in a given *space*, and when this space is much greater than natural it denotes that effusion of pus or of serum has taken place. Lastly, the heart is a solid body, surrounded on three sides by lung; and consequently, when the portion of the chest immediately above it is struck, it returns a dull sound, while all around returns a clear one; and this enables us to determine the extent of the effusion, or, when that is wanting, the *size* of the heart. Such are the physical signs of the heart's action, and according as they are present or absent, modified or natural, we derive much assistance in determining the existence of pericarditis. Thus it is generally supposed we can determine by these symptoms whether any and what effusion has taken place into the pericardium. If, for instance, diffuse inflammation exists, it is denoted simply by pain, but without any other local symptom; if serum be effused in any considerable quantity, the pulse is still strong, and varies from 90 to 100, while the heart feels as though moving in a large space, together with "son mat" of considerable extent on percussion; if lymph is thrown out, a rubbing or cracking-of-leather-sound is heard; while, if pus is effused, the pulse is small and frequent, 120 to 130; and the heart is felt once more beating over a great extent of the chest, which gives a "son mat" on percussion. In general the pulse is accompanied by a bruit, and these symptoms continue till death closes the afflicting scene.

Diagnosis.—When pericarditis results from acute rheumatism, the only disease with which it can be confounded is angina pectoris; but the attack of rheumatism readily distinguishes them. The difficulty of the diagnosis in other forms of the disease has already been stated.

Prognosis.—Acute pericarditis from rheumatism is seldom fatal, if properly treated; but when it arises from any other cause it is far less tractable. Still, however, it is often compatible with life; for Louis found, on examining 443 bodies of persons that had died of other disease, traces of pericarditis in 1 in 11, a circumstance which shows that it is often recovered from. It must be admitted, however, that this disease renders the party prone to affections of the chest, and also to dropsy, and consequently it is an ultimate means of shortening life, although the patient may enjoy many intervals of perfect health.

Treatment.—The treatment of acute rheumatic pericarditis consists in moderate bleedings, and in the exhibition of calomel till the mouth is affected; but this will be treated of more fully under the head of Rheumatism. The treatment of acute pericarditis, the result of simple inflammation, is perhaps not dissimilar, but the cases are so few, and as yet so imperfectly observed, that the methodus medendi can hardly be said to be determined. In the more chronic forms of this affection, the mischief is for the most part irremediable; but the dropsical symptoms admit of much relief from the dried seeds of the iberis in three-grain doses three times a day; also from æther, digitalis, the hitartrate of potash, and perhaps from small doses of mercury.

Of Carditis and of other Simple Organic Diseases of the substance of the Heart.

Carditis is an inflammation of the muscular structure of the heart, and is extremely rare as an idiopathic disease.

Remote Causes.—The remote causes of this affection are rheumatism, probably violent moral affections, drunkenness, together with previous existing disease of the pericardium: the substance of the heart is also acted upon by the poison of the plague and of the small-pox.

Predisposing Causes. — These affections have in general been met with in early adult age, and rarely beyond the age of 50.

Pathology.—The muscular structure of the heart is liable to the diffuse, the adhesive, the suppurative, the ulcerative, and to the gangrenous inflammations. The cases of diffuse inflammation from acute rheumatism are numerous, but the cases recorded of the other forms of inflammation are too few to enable us to give any satisfactory generalization of their phenomena. The relation, however, of a few individual cases will establish the liability of the heart to the inflammatory diseases that have been mentioned.

M. Simonet has recorded a case of *suppuration* of the heart, in which the disease appeared to result from rheumatism. The patient, a woman, was brought to the hospital labouring under most tumultuous action of the heart, with a pulse irregular and contracted, her breathing oppressed, and her extremities cold. She was bled, but died in a few hours in a fit of syncope. Several purulent collections were found in the substance of the heart, and especially in the interventricular partition. The internal surfaces of the cavities were red in several places; the muscular structure was of a yellowish hue, softened, and torn with the least effort.

Dr. Graves was consulted by a gentleman, aged 55, who had complained of palpitation and dyspnœa, and more recently of anarsarca; he suffered also from severe pain and oppression at the region of the heart. Dr. Graves detected hypertrophy and dilatation of the ventricles, and as there was a loud bellows-sound with irregular pulse, he inferred disease of the valves. The patient died suddenly a few weeks afterwards, when there was found, besides hypertrophy, and enlargement of the heart, together with some adhesions, an abscess in the walls of the heart, which contained about two ounces of pus. The valves were generally thickened, but those of the aorta were ossified, while some considerable effusion was found in both pleural cavities.

The last case which it may be necessary to mention in proof of suppurative inflammation taking place in the heart, is one that was examined by Mr. Stanley. In this instance the vessels were loaded with venous blood, and the muscular fibres were of a very dark colour, of a very soft and loose texture, and easily torn by the fingers. On a section of the ventricles numerous collections of dark-coloured pus were seen among the muscular fasciculi. Some of these were seated near to the cavity of the ventricle, while others were more superficial, and had detached the pericardium from the heart. The muscular parietes were also softened, and loaded with dark blood.

Ulceration of the heart has been occasionally seen from an abscess in the walls of the heart having opened either into one of its cavities, or else into that of the pericardium. It has also resulted from the softening of a cancerous tumor, or from a suppurating tubercle. Cloquet has given the case of a man, aged 79, subject to frequent syncope, who died suddenly, crying out fire! thieves! "au feu! au voleur!" and in whose heart there was an ulceration of the left auricle, through which about two pints of blood had escaped into the pericardium.

Ramollissement of the walls of the heart has been occasionally met with. In this affection the heart is flaccid, so that if we make an incision into the ventricles the walls collapse. Its substance also tears with great facility. This disease is almost always accompanied by some change in its colour, which is sometimes deeper than natural, and at others, according to Laënnec, of a yellowish tint, like that of an autumnal leaf,—an appearance which does not necessarily occupy the whole thickness of the muscular substance, but often merely the central layers. This degenerescence is sometimes general, but often partial, affecting only the walls of one ventricle, of the interventricular partition, or else the walls of one auricle. It is from this cause, perhaps, rather than from any other, that the patient sometimes falls from rupture of the heart.

Examples of the rupture of the right side of the heart are more rare than those of the left, or, according to Bouillaud, there are six ruptures of the left side to four of the right side. Rupture of the auricles is perhaps as frequent as that of the ventricles, or, out of the 10 cases mentioned, four were ruptures of the right auricle and two of the left auricle. The extent of the rupture, when it takes place in the ventricle, is very various. In one case the ventricle was ruptured from its apex to its base, along the sulcus which separates the two ventricles. In another, the rupture was from 10 to 12 lines; in a third, the base of the ventricles was severed from the aorta, and one of the aortic valves split transversely. It is remarkable, however, that the rupture has seldom been found at the apex, where the walls of the heart have least force and consistency. The number of the ruptures is as various as their seat; thus out of 48 cases collected by Ollivier, eight were multiplex. Again, in two cases related by Rostan, there were two ruptures in each case towards the apex of the left ventricle. Morgagni gives one case, and Portal another, in which there were three ruptures in the left ventricle, and Andral met with a third, in which there were five ruptures; but of these three were superficial, only two opening into the cavity of the left ventricle.

Corvisart is the first who has given examples of another kind of rupture of the heart, and it is that of the carneæ columnæ, or tendons of the valves; and it is probable that rupture of these parts is owing more frequently to ramollissement, or to induration, than to any other cause. Laënnec, however, mentions a case in which it appeared to result from ulceration. In the three cases related by Corvisart, the rupture followed some violent exertion; and Bertin also saw a case in which one of these tendons was ruptured in consequence of a violent fit of coughing. The first symptom in all these cases has been a sudden sense of suffocation, and the patient has in general suddenly died, although in some instances he has survived a few days.

Induration of the walls of the heart is also an occasional disease of this organ. Bouillaud has collected a series of cases in which this change of structure has been observed. In one the walls of the heart were almost tendinous. In another the carneæ columnæ of the ventricle were so increased in density as to split, " casser plutôt que de rompre." In a third, the walls of the right ventricle seemed to be undergoing a cartilaginous transformation, and Broussais has seen them as hard as a cocoa-nut. The more usual mode of induration is ossification,—a change which usually begins in the coronary arteries, and frequently stops there; but in some rare cases this ossification extends, so that the walls of the auricles, of the ventricles, or both, and sometimes also of the cardiac partition, become converted into bone. There are specimens in the museum of St. Thomas's Hospital which make it remarkable how life could have been continued, looking to the unyielding nature and great extent of the ossification of the walls of the heart.

Hypertrophy is an abnormal increase of the muscular substance of the walls of the heart, and although occasionally an idiopathic disease, is more commonly a secondary affection, caused by disease of the valves. The hypertrophy may be general or partial, that is, may affect the whole heart, or one side of the heart, or one ventricle or one auricle, or the ventricle of one side and the auricle of the other; or else both ventricles or both auricles; or indeed every possible combination of the four cavities. The auricles, however, are much less frequently affected than the ventricles.

The natural thickness of the walls of the left ventricle is in the adult about $6\frac{1}{2}$ lines; but Laënnec has seen them an inch and a half, or 18 lines in thickness at the base, when affected with this disease, or triple the healthy standard. This thickness generally diminishes towards the apex, which latter is often natural; but in other cases even the apex is thickened, and instead of two lines it measures four lines. The carneæ columnæ and likewise the cardiac partition are also proportionably hypertrophied in these cases.

In hypertrophy of the right ventricle the walls are more uniformly thickened than in hypertrophy of the left ventricle; still, however, the increased thickness is always more marked about the tricuspid valves, and at the origin of the pulmonary artery. The greatest thickness observed has been seldom more than four or five lines, which, taking the natural thickness at $2\frac{3}{4}$ lines, is scarcely a two-fold increase. In malformations of the heart, however, it has been found much greater; and both Bertin and Louis have each seen a case in which the foramen ovale was open, and in which the thickness varied from 12 to 16 lines. Besides an increase of thickness, the walls of the right ventricle, when hypertrophied, acquire a greater firmness, so that on cutting through the walls they do not collapse.

Hypertrophy of the heart seldom takes place without an alteration in the size and form of the chambers. These may indeed be natural, but more commonly they are either increased or diminished; or supposing each chamber to measure 10 square inches in health, it sometimes measures from 15 to 20, or even more; or supposing it, when of the natural size, to hold two ounces, when thus diseased it will often contain a large portion of a pint. This state of parts has been termed *eccentric* hypertrophy: and admitting the normal heart to weigh $9\frac{1}{2}$ ounces, the weight in hypertrophy is often double or triple that amount; and Bouillaud speaks of 18, 20, and 22 ounces being not uncommon. On the contrary, hypertrophy sometimes takes place *concentrically*, or at the expense of the cavity of the heart, and from this cause the ventricle has been found so reduced in size as to be not larger than an unshelled almond.

Atrophy.—The walls of the heart may be atrophied instead of being hypertrophied, so that this organ has been found to weigh in one case only four ounces two scruples, instead of nine and a half ounces, while the thickness of its parietes was reduced to little more than a thin membrane. This atrophy may be general or partial. In some cases the atrophy takes place without any notable alteration of the capacity of the chambers of the heart, and this is termed *simple* atrophy. More commonly, however, when the walls are thinned, the chambers of the heart are enlarged, and this is termed *eccentric* atrophy. Again, the whole heart may be atrophied and reduced in size, as is often seen in phthisis. Thus Bouillaud gives the case of a woman, aged 61, whose heart was no bigger than that of a child 12 years old. While Burns gives the case of an adult whose heart did not exceed that of a new-born infant; and this form has been termed *concentric* atrophy.

Dilatation of the cavities of the heart, it has been stated, may exist both when the heart is hypertrophied or atrophied; but it may also exist when the walls of the heart are of their natural thickness. In any case the dilatation may be partial or general. Partial dilatation of the heart sometimes presents many curious phenomena; thus the walls of the right ventricle have been seen divided into two distinct parts, or, as Laënnec has described it, into a sort of hour-glass contraction.

In other cases this partial dilatation is perfectly aneurismal. Corvisart gives the case of a young negro, who died suffocated, and in whom the superior and lateral part of the left ventricle was surmounted by a tumor almost as big as the heart itself. The inner surface of this tumor contained many concentric layers of lymph, exactly similar to those of an aneurismal sac. The cavity of this tumor communicated, by means of a small opening, with that of the ventricle. Laënnec mentions two cases in which a tumor, of a globular form, and the size of duck's egg, was situated at the point of the left ventricle, and communicated with the ventricle by an opening an inch in diameter. In these cases the left side of the walls of the sac presented a continuation of the muscular fibres of the heart, while on the right side they appeared formed by the two pericardia. Laënnec thinks that these aneurismal tumors are formed by ulceration of the internal walls of the ventricle, as in false aneurism of the arteries; others that it is owing to a separation of the muscular fibres, and the protrusion of the inner pericardium. There are some fine specimens of this disease in St. Thomas's Hospital.

Hydatids have been found in the walls of the heart, beneath the inner membrane. Dupuytren found hydatids in the thickness of the right auricle, forming a tumor, projecting into the cavity, as large as the heart itself. Morgagni found in an old man, who had in no degree suffered from palpitation, syncope, or irregularity of pulse, but had died of acute disease, a serous cyst the size of a cherry, in the walls of the left ventricle.

Fatty Degeneration.—It is not uncommon to meet with the heart loaded with fat deposited between the muscles and the reflected pericardium, especially at the junction of the auricles with the ventricles; also along the trunk of the coronary veins, at the two edges of the ventricles, at the apex, and at the origin of the aorta and pulmonary artery. The right ventricle is often almost entirely covered with it, and even the left ventricle presents a given quantity about its centre. The more a heart is thus loaded with fat the thinner are its muscular walls, so that in some cases, at the apex and at the walls of the right ventricle, the fibrous structure has almost disappeared, and the carneæ columnæ consequently appear to spring altogether from the endo-pericardium. The muscular fibres, however, which remain are healthy.

In other instances the muscular fibre, instead of being displaced or absorbed, undergoes a fatty degenerescence similar to what has been observed in other muscles; and in this case the muscular fibre becomes of a yellowish colour, like that of a dead leaf, and like to that of certain softened hearts. Laënnec has generally found this steatomatous degeneration partial, and limited perhaps to the apex. In a case which occurred at St. Bartholomew's Hospital, the whole heart had suffered from this degenerescence, so that it appeared little more than a fatty bag, and it was quite extraordinary how the organ had continued to act.

Symptoms of Carditis.—Few authors have met with a case of carditis, unless complicated with pericarditis, and no distinction has hitherto been observed between the symptoms of these two diseases. Corvisart says it is impossible to distinguish between these affections. M. Laënnec affords us no assistance in this dilemma, for he considered that no incontestible example of carditis existed; while Bouillaud says he knows of no symptom which is especially characteristic of carditis. The little that is known of *ulceration* of the heart has already been mentioned.

The symptoms of *ramollissement* of the heart are a feebler impulse, a slower beat, and greater dulness of the sounds of the heart. Patients suffering from this affection are usually hypochondriacal, liable to palpitation on the least exertion, and often die from the ventricle rupturing.

The symptoms of *induration* of the heart are—a stronger impulse and a louder sound than usual. This class of patients is greatly subject to angina pectoris.

The symptoms of *hypertrophy* of the heart are local and general. The local symptoms are a more powerful impulsion, a wider range of action, and some change in the sounds of the heart. There is also a greater extent of dulness of sound in the cardiac region, and sometimes a bulging-out of the left side.

The increased impulsion in hypertrophy of the heart is in proportion to the greater thickening of the walls. Thus in slight cases it is only sensible to the hand, while in others the heart "knocks against the ribs," and even raises the head of the auscultator. This greater impulse, also, not only often causes a vibration of the præcordial region, but even shakes the whole of the chest. Besides being sensible to the touch, the abnormal action of the heart in these cases is often sensible to sight, each contraction agitating the patient's dress, and sometimes even moving the bed-clothes. The point of the heart also deviates more to the left, and its motions may be sometimes traced from the second or third rib as low as the sixth or seventh intercostal space.

The increased thickness of the walls of the heart is evidently unfavourable to the transmission of sound; and it is plain, therefore, that in simple hypertrophy, without enlargement of the cavity, the natural sounds will be duller than in the normal state; and also, if the hypertrophy be concentric, or with smaller cavities, that they will be scarcely heard. When, however, the cavities are enlarged, as in eccentric hypertrophy, the sounds are often clear, full, and even much louder than natural.

In hypertrophy of the left ventricle the impulse is stronger immediately under the inferior portion of the sternum than between the fifth and sixth ribs. Lavoisi has laid it down as a sign of hypertrophy of the right ventricle, that there is swelling of the jugular veins, which now pulsate synchronously with the carotids. Corvisart has repudiated this symptom, but Laënnec says he has found it in every case he has seen of hypertrophy of the right ventricle. In general this pulsation is limited to the inferior parts of the jugular veins, but in other instances it has been seen to extend to the superficial veins of the arm. He regards this symptom, therefore, as one of the best diagnostics of hypertrophy of the right ventricle.

In estimating the general symptoms of hypertrophy of the heart, our knowledge of the influence of the left ventricle over the arteries would lead us, *à priori*, to infer that one of the effects would be a disposition to congestion and to hæmorrhage; and that apoplexy, hæmoptysis, and hæmorrhage from the bowels would often result. It appears, according to Bouillaud, that this reasoning is correct; for out of 54 cases of hypertrophy of the heart, 11, or one-fifth, were attacked by cerebral hæmorrhage or central ramollissement. As many, perhaps, suffer from pulmonary hæmorrhage, while a few suffer from hæmorrhage from the bowels. Indeed, on opening bodies that have died of this disease of the heart, we find the abdominal viscera and mesenteric veins loaded with blood. More commonly, perhaps, hypertrophy is connected with many diseases of function, as asthma or dropsy. The causes of this conjunction with asthma are not very well understood; but it probably arises from the circumstance, that when one branch of the eighth pair, or that supplying the heart, is affected, the other branch which supplies the lungs must partake of the disease, and hence asthma. The causes of its conjunction with dropsy is, that the heart acting too forcibly, the capillary system becomes congested, and serum is effused. The conjunction of hypertrophied heart is also very common in albuminous dropsy; but whether it is a primary or a secondary affection has been disputed, some considering the diseased state of the kidneys to be caused by congestion, induced by the state of the heart, while others consider the kidneys to be primarily affected, and the disease of the heart to be caused by the impoverished condition of the blood; and this latter is certainly the most probable theory. Besides these concomitants, a pouchy or otherwise diseased state of the aorta often co-exists with hypertrophied heart,—the diseased aorta being caused by the abnormal power of the heart, or else the hypertrophy of the heart results from a supplemental force being necessary to compensate the lost power of the aorta. Many persons affected with hypertrophy of the heart suffer severely from angina pectoris, with palpitation, but it is singular that in general the pulse is natural, except the patient be excited, when it is full and strong.

The symptoms of *atrophy* of the heart are also local and general. The local symptoms are, a feeble impulsion of the heart, while its sounds are louder, clearer, and more distinct than in health; the intensity of sound being greater in proportion to the atrophied state of the walls, combined with increase of size of the chambers of the heart. The general symptoms are, slowness of the pulse, occasional palpitation, difficulty of breathing, and tendency to dropsy. It may appear singular, that as nothing can be more opposed than hypertrophy and atrophy of the heart, that dropsy should equally occur in both cases; but the loss of power of the heart causes a remora or stasis of the blood in the capillary system, equally with its excess of power, therefore the same consequences result. This disease, it has been stated, sometimes terminates by rupture of some chamber of the heart.

The symptoms of *dilatation* of the chambers of the heart, when the walls are of a natural thickness, are merely an augmentation of sound, while their *contraction* is known by a diminution of sound. Aneurism of the heart is so rare that its symptoms can hardly be said to be determined. The celebrated Talma, among other affections, had an aneurismal tumor as large as a pullet's egg on the apex, but no such affection was suspected during life. Most of the specimens in our museums have been obtained from the dissecting-room, and consequently without any previous knowledge of the case. It is probable, however, that the symptoms must be some bruit and some frottement conjoined with some irregular action and displacement of the heart. Hydatids of the heart have likewise as yet no determinate symptom; and little is known of the phenomena resulting from fatty degenerescence, except that the pulse is feeble and the impulse trifling.

Diagnosis.—The diagnostic symptoms of carditis, of ramollissement, and of induration of the heart, are imperfectly known. On the contrary, the symptoms of hypertrophy of the heart, and of enlargement of its chambers, are so striking that it is impossible to mistake them; but it should be remembered they are often latent, unless aroused by some mental emotion, or sharp exercise. Hydatids and fatty degeneration, it has been stated, are too infrequent to allow us to consider their diagnostic symptoms as determined.

Prognosis.—It is probable that diffuse inflammation of the substance of the heart often exists, and is often recovered from, but if any morbid product forms in it the prognosis is fatal. Ramollissement, as well as induration of the heart, from the tendency to rupture in the one case, and to ossification in the other, if they can be determined to exist, are always of grave prognosis, although the patient perhaps may survive many years. Hypertrophy, atrophy, or dilatation of the heart, are perhaps compatible with health, till dropsy or hæmorrhage takes place, when the conjoint diseases are either most difficult of cure or else fatal. Hydatids of the heart are fatal, but fatty degenerescence is perhaps compatible with prolonged existence.

Treatment.—What little we know of Carditis would lead us by analogy to imagine that the cure of diffuse inflammation is by bleeding and mercury, so as to affect the constitution. If pus, however, should form, no remedy promises to be beneficial. We possess no determinate remedy for ramollissement, and should such disease exist the best chances for the patient are, attention to his general health, country air, with a liberal diet. An indurated state of the heart is perhaps little influenced either by mercury, or the iodide of potash, or any other alterative medicine; and the treatment consequently resolves itself into mitigating the attacks of angina, by which it is so usually accompanied, by means of opiates, æther, and camphor.

"Of all the organic affections of the heart," says Laënnec, "hypertrophy, with or without dilatation, appears to me the most susceptible of cure. But to obtain this success it is necessary that the physician, as well as the patient, should arm themselves with equal firmness; for it requires no less tenacity of purpose in the latter to support frequent bleedings, and a perpetual fast, than in the former to contend with the opposition of parents or of friends, and the discouragement which must at times take possession of the patient, who must endure this treatment for many months, or perhaps many years."

This treatment laid down, probably theoretically by Laënnec, is certainly not found to be practically beneficial; for bleeding very constantly, instead of quieting the impulsion, only renders the heart more irritable and its action greater. Again, such an amount of bleeding as would affect the heart would probably debilitate the already weakened capillaries in a still greater degree than the heart, and consequently determine the dropsy which so often ensues. As a general principle, therefore, Laënnec's views should be adopted with much caution; for with respect to bleeding, much observation has shown that it is rarely beneficial, except the hypertrophy he accompanied by hæmoptysis; and in such case moderate bleeding, with the inf. rosæ c. tinct. digitalis ♏ viij. to xij. c. magnes. sulphatis ʒ ſs. to ʒ j. is the best treatment. When, however, hypertrophy of the heart is unaccompanied by hæmorrhage, we usually find that quiet, with some transient stimulant, as mist. camph. c. sp. æth. nitr. ʒ j. c. sp. ammoniæ aromatici ʒ ſs. ter die vel 6tis horis, tranquillizes its abnormal action far more successfully than any other treatment. If the hypertrophy be accompanied by dropsy, the semina iberidis exsicat. gr. iij. to gr. v. are perhaps the most powerful remedy; but should this fail, other diuretics, as the bitartrate of potash, elaterium, or acetate of potash, with squills, may be tried.

No remedy is known for atrophy of the heart, except a generally tonic treatment. Neither is it possible to restore the enlarged chambers of the heart to their natural dimensions, although by care life may be enjoyed for many years. Hydatids of the heart are perhaps irremediable; and fatty degenerescence can only probably be mitigated by an alteration of the patient's habits of life.

Endocarditis is an inflammation of the serous membrane forming the valves and lining the chambers of the heart. The diseases of this membrane are by far the most frequent of all the affections of the heart, and often lay the foundation of all the other forms. Indeed it may be said to constitute at least 19-twentieths of all the diseases of this organ.

Remote Causes.—The inner membrane of the heart, exposed as it is to the action of many morbid poisons, and also, we should imagine, to many medicinal and other substances taken up by the absorbents and introduced into the circulation, renders it singular that it is not found still more frequently diseased than it really is. Of all classes of substances, however, alcohol has the most striking effects on this tissue; for this fluid is not only proved to be absorbed and actually to circulate in a free state in the blood, but there are few drunkards the inner membrane of whose heart and large vessels is not more or less diseased; so that this fluid probably acts as a specific poison on that part. The rheumatic and gouty virus appears to act upon this tissue, and many persons improperly treated for those complaints often ultimately die of some form of endocarditis.

Predisposing Causes.—It is very rare to find disease of the inner membrane of the heart in children, but occasionally ossification of the valves has been seen as early as 10 years old. As a general rule, however, these affections commence with early puberty; and two boys, about 16 years old, are now in St. Thomas's Hospital labouring under endocarditis. This tendency increases with age, so that there are few old persons the inner membrane of whose heart and arteries is not more or less diseased. Women are by no means free from these complaints, but from their more temperate habits they are less prone to them than men.

Pathology.—As the pathological phenomena of the membrane lining the *right* side of the heart are in many respects different from those of the *left* side, it consequently seems best to consider them separately.

The internal membrane of the left side of the heart is liable to the diffuse, the adhesive, and to the ulcerative inflammations; and these inflammations may attack either the chambers or the valves of the heart, or both; but, like all hollow organs, the orifices and valvular structure are, by a species of preference, by far the most frequent seat of disease. They may be either acute or chronic.

Acute diffuse inflammation of the membrane lining the left chambers of the heart is occasionally seen after the application of a ligature round an artery, for the cure of a femoral or other aneurism; the inflammation thus caused spreading along the serous membrane of the artery till it reaches the heart. This form of inflammation, so demonstrable in surgery, is occasionally seen in medicine, and may invade the chambers either of the auricle, the ventricle, or both. The inflamed membrane is of a bright rose colour, its structure something thickened, and it is more easily detached than usual. The student, however, should be warned that the colour may be similated by transudation of the colouring matter of the blood, after death, staining the membrane. There is no evidence of the inner membrane of the left chambers being the seat either of serous or of purulent inflammation; for, if those forms do exist, the morbid product is swept away in the torrent of the circulation. It is, however, liable to the adhesive inflammation; and instances are met with of lymph being attached to the inner surface of the left auricle, and in considerable quantities, though perhaps not organized. Another proof of the adhesive inflammation is the membrane of both chambers being occasionally found greatly thickened, silvery, and opaque. Again, this tissue is liable to the ulcerative inflammation; and a student of St. Thomas's Hospital died from this cause a few years ago. In the chronic forms of inflammation this membrane, in a few instances, is found to be the seat of cartilaginous or of ossific deposits.

The valves of the left side of the heart, like the inner membrane of its chambers, are unquestionably liable to the diffuse, the adhesive, and to the ulcerative inflammation, and these may be acute or chronic.

Diffuse inflammation of the valves is often seen, the tissue being of a rose colour and thickened. The valvular tissue is also the seat of adhesive inflammation, both at its free and at its cellular surface. The instances of its occurring at its free surface are extremely numerous and well marked. Thus lymph is occasionally found strongly adherent on the external surface of the valves, and this lymph occasionally becomes organized, forming those fringe-like or fibrinous warty growths which are often met with on the mitral or aortic valves. It is by this process that the three aortic valves, or else the mitral valves, are sometimes found all soldered together; so that, except for the contraction which takes place in all inflamed parts, the orifice would be closed; but, notwithstanding that process, it has been found sometimes a mere slit, or even reduced to the size of a goose-quill; while Corvisart speaks of an instance in which the orifice, which in health is upwards of three inches in circumference, was reduced to three lines in diameter. In other instances only one valve is affected; and this may be turned up and bound to the aorta, or it may be turned down and bound to the inner surface of the heart, or it may be rolled up, taking the form of a shell, and two or more of these circumstances may co-exist in the same heart.

Adhesive inflammation of the inner or cellular surface of the valves is seen by their often becoming greatly indurated and thickened, so that their action is much impaired; or these changes may be limited to the fibrous zone which forms the base of the valves, surrounding the aortic orifice with a sort of collar, contracting its diameter as well as impeding the play of the valves. In other cases the thickening may affect the free edge, or else the central portion of the valve, as the tubercula arantia. The most remarkable circumstance, however, connected with chronic adhesive inflammation of the left side of the heart, is the excessive tendency which the valves have beyond all other serous tissues to become cartilaginous or ossified. These new formations sometimes originate in the substance of the serous tissue, but more commonly are deposited in the subcellular tissue connecting the duplicature of the valvular fold. This ossific deposition is not necessarily preceded by a cartilaginous formation, but is most frequently an original abnormal secretion, often containing a good deal of earthy matter. It is deposited in various forms: sometimes in layers, at others in points, and at others in large masses, knobbled or pyramidal, and occasionally acquiring a large size, so much so that Bertin saw one as large as a pigeon's egg. Sometimes the tendons, or the chordæ tendineæ attached to the mitral valve, participate in these indurations, and Corvisart met with one entirely ossified; and when thus indurated and rendered brittle they sometimes rupture, and the patient dies perhaps in a few minutes. The irritation of these deposits often causes the membrane to ulcerate, and the ossific matter, exposed and discoloured by being bathed in the current of the blood, has been mistaken for caries. Ulceration, however, sometimes takes place superficially without any such irritating cause, and the valves are even occasionally found perforated.

As the diseases of the veins differ greatly from those of the arteries, we should consequently expect that the diseases of the right side of the heart would in many respects differ from those of the left; and this is the case: for although the inner membrane of the right side of the heart is liable to the diffuse, the adhesive, to the ulcerative, and perhaps to the suppurative inflammations, still it is very rarely the seat of cartilaginous or of ossific deposits.

Acute diffuse inflammation of the serous membrane of the right side of the heart has often been seen in surgery, in consequence of inflammation of a vein spreading to the right cavities of that organ; and by many medical writers this is supposed to take place idiopathically. Serous inflammation is not known to exist in the veins, neither is it proved to affect the right side of the heart. Suppurative inflammation, however, does often affect the veins, sometimes forming a long chain of abscesses, and consequently may affect the right side of the heart; but if so, the morbid product is instantly removed, and consequently the fact is doubtful. The adhesive inflammation, however, though by no means so frequent as on the left side of the heart, is far from being unusual. This is evidenced by the tricuspid valve being often found thickened and bound down, so that the auriculo-ventricular opening is greatly narrowed. The sigmoid valves have also been found similarly diseased, so that, instead of being 3 inches in circumference, the pulmonary orifice is so greatly reduced as sometimes not to have exceeded 4, 3, or even 2½ lines in diameter. Lymph has also been found, as is supposed, effused at the free surface of the right auricular serous membrane. Ulceration also occasionally takes place in this membrane, the septum of the heart having been found perforated, and the pulmonary valves occasionally are seen in a similar state.

The cartilaginous and osseous formations so common on the left side of the heart, are infrequent on the right side; still, however, they have been met with, and more especially when from any congenital malformation, or other cause, the right and left sides of the heart have communicated, and the arterial and venous blood of those cavities been mingled. Morgagni gives the case of a young woman, aged 16, in whom the valves of the pulmonary artery were cartilaginous, with a point of ossific matter, and were so adherent that the orifice was greatly contracted. In this case the foramen ovale was open, and the patient laboured under cyanosis, or the blue disease—"Maladie bleu." Vieussens, Hunauld, Bertin, and others, have seen instances of osseous or of cartilaginous indurations of the right side of the heart. But the most extraordinary case of this kind is that observed by Cruwel in an octogenarian. In this case the tricuspid valve was cartilaginous in many points, and osseous lamellæ extended from the base of the right auricle, behind the internal membrane of the right ventricle, of which some of the columns were ossified. Small osseous concretions were also observed in the vena cava. A small globular body, pierced with two openings, with cartilaginous walls, and partly ossified, was *enclavée* between the valves of the pulmonary artery. Some ossifications also existed on the left side of the heart, and in the pericardium.

A diseased state of the valves, whether of the right or of the left side of the heart, is usually accompanied by atrophy or hypertophy of its walls, and also with dilatation of the different chambers of the heart. These abnormal states arise from the circumstance, that any impediment to the circulation situated at the orifices of the heart, or any alteration in the form of the orifice, affects the quantity of blood discharged, and calls on the heart for increased exertion, and thus leads to an alteration both in the strength of its walls and the size of its chamber. Thus, supposing the aortic orifice to be diminished from any cause one-half, it is the law of the discharge of fluids through orifices, that the quantity of blood propelled through them by the same force is reduced to *one-fourth*, and consequently the heart will be required to exert a *four-fold* force, should such an event occur, in order to transmit the usual quantity of blood, and to carry on the circulation. This call on the heart's powers may perhaps be met in some few sthenic individuals, and the walls become so greatly hypertrophied as to supply by an increased velocity the diminished quantity of blood which must otherwise be thrown out at each systole of the heart. But more commonly the heart, even of a powerful man, is seldom long able to contend with a permanent obstacle, and much less so that of a patient of a feeble habit, and consequently the physical force of the heart gives way. In either of these cases, also, a *remora* of the blood takes place in the chambers of the heart, it accumulates, and they enlarge. The most usual alteration is a pouchy state of the ventricle at the insertion of the aorta, so that its orifice is no longer in the direct line of the axis of the heart, and the counter currents, as well as physical obstruction thus produced, still further diminish the discharge. It follows as a necessary consequence, then, that any change in the form of the orifice, or of the ventricle, or any obstruction caused by the valves, necessarily contribute to an hypertrophied or atrophied state of the heart, and to an enlargement of its chambers.

The changes which have been mentioned once established, the evil goes on increasing; for, supposing the chamber of the ventricle to average 10 square inches, and each square inch to exert a force of 4 lbs., the whole force that the cavity exerts at each contraction is 40 lbs. If, however, the chamber of the heart become enlarged to 11, 12, or 15 square inches, the force to be exerted will be increased from 40 lbs. to 44, 48, 60, or even more pounds; thus the distending force increases with the weakness and dilatation of the cavity, and renders a return to a healthy state almost impossible. The heart, then, once enlarged, often continues to increase, till at last its chambers acquire such a size that the valves are no longer capable of closing their respective orifices, and "a permanent patency," as it is termed, ensues; when the column of blood making a constant pressure on the ventricle, the powers of the heart are rapidly exhausted, and the patient shortly dies. The distending force acts equally, or nearly so, on all parts of the dilated chamber; but if the walls of the heart be enfeebled at any given portion, that portion sometimes giving way, the heart may rupture, or else the aneurismal tumors of the heart that have been mentioned form. Such are the mechanical laws which govern this class of disease.

Symptoms.—The cases of acute inflammation of the inner membrane, lining the chamber of the ventricle or of the auricle, are so few that their symptoms are by no means determined. They are generally, however, considered to be delirium, fever, and an exceedingly irregular pulse, together with much anxiety and oppression at the præcordia.

Acute inflammation of the valves of the aorta is seldom seen, except combined with rheumatism; and the physiological symptoms are pain or angina of the chest, while the physical contractions of the heart are marked by a "bruit de soufflet."

In chronic inflammation of the valves there is no pain, nor is it until the play of the valve is impaired, or the orifice contracted, that it gives rise to any well-marked physiological or physical symptom. The physiological symptoms are—a frequent irregular pulse, occasional palpitations, asthma or cough, with bronchitis. These disordered actions of the organs of the chest are at length followed by the capillary system giving way, either from sympathy with the diseased state of the heart, or else from mechanical congestion, and hæmorrhage and dropsy are the most frequent consequences, so that the patient most commonly dies either from apoplexy, or hæmorrhage from the lungs or bowels, or else from hydrothorax, ascites, or some more general form of dropsy. It is remarkable, however, that as soon as the dropsical effusion has taken place, the pulse generally becomes slower and the bruit less loud. But these apparently favourable symptoms are not followed by any amendment; on the contrary, the dropsy increases, and the two diseases quickly destroy the patient. It is singular, also, and marks an advanced stage of the disease, that the pulse is in many cases not synchronous with the systole of the ventricle, which shows that in disease the arteries have an action independent of that of the heart.

The physical symptoms which denote a diseased state of the valves are, the peculiar bruit and the impulsion. In health it has been stated that the contractions of the ventricle are accompanied by a peculiar sound, and that of the auricles by another; but when the valves of the heart are diseased, these natural sounds are changed into what is technically termed a "bruit," or an abnormal modification of the natural sounds. The peculiar character of the bruit depends on the degree in which the orifice is contracted, and also on the state of the valve itself, or whether it be rough or smooth. If smooth, we have generally a "bruit de soufflet," or bellows-sound; if, on the contrary, the valve be fringed, or ossified, or otherwise irregular, we have a rasping, filing, whistling, and sometimes even quite a musical sound. The rule for determining the particular valve affected is, if the sound be heard loudest on a level with the lower edge of the third rib, and a little to the left of the mesial line of the sternum, it is the aortic valve which is affected; and on the contrary, if the sound be heard loudest more to the left, and between the fifth and sixth ribs, it is the mitral valve. When, however, it is remembered that the valves of either orifice are contiguous, and in the same line, it will be plain that much difficulty must and does exist in determining the particular valve affected. Sometimes both valves are affected, and then we have a double "bruit."

When the orifices of the heart are so dilated, or the valves so bound down that they cease to close the orifice, a permanent patency, as it is termed, is established. If the defect of the closure be inconsiderable, this also causes a double bruit; the first taking place on the contraction of the ventricle, and the other on its relaxation, caused, as is supposed, by a *regurgitation.* If, on the contrary, the orifice be greatly enlarged, so that the column of blood rests on the ventricle, hardly any bruit is heard, and the incessant effort the heart is now obliged to make to free itself from the blood at length so enfeebles it that the pulse becomes a mere flutter, and the patient rapidly sinks. Again, if the orifice be a mere slit, the same absence of bruit has been observed, the powers of the heart being probably so reduced as to be only capable of exciting a force sufficient to furnish the quantity of blood equal to that discharged by the diseased orifice. As a general law, when the valves are diseased the intensity of the sound varies directly according to the size of the chambers, combined with the degree of the hypertrophy of their walls, the sound being loudest when increased size is united to increased power. As a general law, also, the intensity of the impulse varies directly according to the degree of hypertrophy of the walls.

Diagnosis.—The diagnosis of disease of the valves of the heart is sometimes difficult in slight cases, from our liability to confound the respiratory bruit with the valvular bruit; but a little attention and a repeated examination will remove this error. Another circumstance of difficulty in the diagnosis is, that when the valves are greatly diseased, and the heart rolling, the quantity of blood projected at each contraction is so small that no bruit is produced. Under these circumstances, the patient should be kept quiet for some minutes, when the circulation will become more tranquil and the bruit will return, and often be loudly heard. Position, also, as lying on the back, diminishes the intensity of the sound, the heart in this posture circulating the blood with less difficulty.

Prognosis.—In every case of diseased valves, the prognosis is unfavourable; indeed, hardly an instance is met with of perfect recovery. The patient, however, often survives many months, and even some years, if he can command the comforts of life without the necessity of personal exertion.

Treatment.—Endocarditis, from whatever cause, is one of the most intractable diseases we are at present acquainted with. A few patients do recover after the establishment of the bruit, but it is probable in these cases the bruit must be caused by some irregular muscular contraction of the heart, and not from actual disease of the valves. For when the valves are thickened, indurated, or united by inflammation, there is no authenticated case of the patient's being again restored to health. Such an obstacle consequently appears to be permanent; for neither mercury, nor the iodide of potash, nor any known metal, salt, or acid, purgative, emetic, or tonic remedy seems to have any power to remove it. It will be plain, also, if the obstacle be permanent, that bleeding to any amount will cause debility, and facilitate probably the occurrence of the more severe and fatal symptoms; and this operation should seldom be had recourse to, unless the patient suffers from a considerable hæmoptysis. It is difficult, since this affection is followed by asthma, dropsy, and so many different trains of disease, to lay down any given rules of treatment; but gamboge gr. ij. c. opii, gr. ſs. ter die, the seminum iberidis gr. iij. ter die, tinct. digitalis ♏ viij. to xij. ammonia, camphor mixture, and æther, and the bitartrate of potash are among the most efficient remedies we possess. These always palliate the symptoms; but an apparent cure is almost always shortly followed by a relapse.

The diet of the patient should be light but nutritious, and when these qualities are conjoined its particular nature is perhaps not important.

The diseases of the aorta and large arteries often play a great part in medicine; but as the diseases of the arteries must necessarily be treated of in surgery, we purposely omit them.

Order II.—Of Rheumatism.

Rheumatism is a peculiar inflammation of the fibrous tissues, especially of the muscles, tendons, aponeuroses, bursæ, capsular ligaments, cartilages, and bones. It differs from ordinary inflammations in its little tendency to ulceration, and also in its great tendency to metastasis, or to shift from part to part.

This disease derives its appellation from ρεω, to flow; it being the opinion of the old physiologists that the different humours of the body were first sublimed, then condensed in the brain, whence they flowed to different parts of the body, and when over the fibrous tissues they produced rheumatism; 1030 persons are said to have died of this affection in 1838, and 946 in 1839, in England and Wales.

Remote Causes. — There are few morbid poisons which do not produce pains which cannot be distinguished from rheumatism: thus typhus fever begins by pains in the bones and muscles, and often ends with severe pains in the legs. The paludal poison also often leaves severe hemicrania, or rheumatic affection of one side of the head. In small-pox the patient often suffers for several days from pains which have frequently been mistaken and treated for rheumatism. In scarlatina the joints are often the seat of the severest rheumatic inflammation; while in syphilis nothing is more common than for the patient to be long racked with what appear to be rheumatic pains. It is plain, therefore, that morbid poisons are a frequent cause of a condition of parts which cannot be distinguished from rheumatism; and it is a question whether some undefined miasm of this class is not therefore by far its most frequent cause; again, if we look to the course of the disease, it differs from all ordinary inflammations in the tendency it has to subside in one part and to appear in another, phenomena explicable on the laws of morbid poisons, but which are opposed to all we know of the laws of ordinary inflammation. Supposing this view of the case should ultimately prove correct, it will follow that cold and wet, by lowering the vitality of parts, greatly assist in pointing to the particular seat of the action of the poison, but are not the great agents in the production of this disease.

Any more express investigation into the remote causes of rheumatism is extremely unsatisfactory. They are generally supposed to be identical with those causes which produce catarrh; still in all probability catarrh itself depends on a morbid poison. Those, however, who refer catarrh to the vicissitudes of temperature, attribute rheumatism to this cause; but the returns of rheumatism occurring in the different commands of our army seem to shake this hypothesis: they are as follows:—

—	Jamaica.	Nova Scotia and New Brunswick.	Bermuda.	Malta.	Ionian Islands.	Gibraltar.	Canada.	Mauritius.	Windward and Leeward Command.	United Kingdom.	Cape of Good Hope.
Ratio per 1000 . . Annual mean strength	29	30	33	34	34½	38	40	46	49	50	57

"Thus," says Major Tulloch, "we find in the mild and equable climate of the Mediterranean or the Mauritius the proportion of rheumatic affections is even greater than in the inclement regions of Nova Scotia and Canada; and though some of the provinces of the Cape of Good Hope have occasionally been without rain for several years, yet rheumatism is more frequent in that command than in the West Indies, where the condition of the atmosphere is as remarkably the reverse." Exposure to wet, however, would appear to have much influence in the production of rheumatism, for we find the returns of the navy show a considerably larger proportionate number of attacks than in the army. The number per 1000 annual mean strength attacked in the Mediterranean fleet being 63·9, in the West India and North American station 69, and in the South American station 72·3.

Some writers have supposed that the cause of rheumatism lies not so much in the abstract degree of cold as in the range of atmospheric vicissitudes; and Dr. Haygarth has estimated that the number of persons attacked with rheumatism in summer is to those attacked in winter in the ratio of 5 to 7. But Hippocrates says, it is not in the heats of summer and depths of winter, when the variations of temperature may be supposed to be a maximum, but rather in the spring and autumn, when the weather is warm but variable, that rheumatism most frequently prevails.

Whatever may be the remote cause of rheumatism, Dr. Haygarth thinks it remains latent from 2 to 6 days, while Giannini extends the period to a fortnight. Chomel, however, conceives it may in some cases be brought into action in from 12 to 24 hours.

Predisposing Causes.—A very small number of children suffer from rheumatism; for out of 73 cases given by Chomel 2 only were attacked under 15 years—35 for the first time between 15 and 30—22 from 30 to 40 —7 cases from 45 to 60—and 7 cases after 60. At whatever age, however, rheumatism occurs, one attack establishes a predisposition to another, so that at last many persons are never free from it but are martyrs to this affection. Men are supposed to be more liable than women to rheumatism, and Dr. Marlow says in the ratio 137 men to 89 women. After menstruation, however, has ceased this greater immunity terminates

Pathology.—The essential nature of rheumatism in its simplest state is a mere *neurosis*, the inflammatory state, though common, being consequently an occasional accident, for many patients have died after long suffering from rheumatism, and, having been carefully examined, not the slightest trace of inflammation has been discovered in the affected limb or joint. Whichever form of this affection takes place, it has a tendency, says Dr. Budd, which " repeats itself in the fellow limb, not merely with a general correspondence of situation, but joint for joint, bursa for bursa, sheath for sheath,"—shooting sometimes from part to part with the violence of a galvanic shock, and occasionally attacking two legs of the vital tripod, or the heart and brain.

The parts affected in rheumatism are so numerous, being ligaments, fascia, aponeurosis, periosteum, perichondrium, bones, muscles, tendons, bursæ, and the serous membranes of the heart and brain, that it is impossible, within the limits prescribed to us, to enter minutely into the pathology of rheumatism ; all we can do is to state generally that these parts are liable in rheumatism to be the seat of diffuse, of serous, of adhesive, and sometimes of purulent as well as of ulcerative inflammation ; and these inflammations may be acute or chronic, chromatous or achromatous.

When the patient has fallen from an attack of acute diffuse rheumatic inflammation, the muscles of the affected joint, or of the heart, have been found evidently injected, and of a deep venous red or black colour. Also, the synovial membranes, the pericardium, and the membranes of the brain, when those tissues have been affected, have likewise been found red and injected, thus affording abundant evidence of the existence of diffuse inflammation in acute rheumatism.

The diffuse inflammation may terminate by resolution, or serum may be effused. *Serous* inflammation is extremely common, and is evidenced by the swollen state of the bursæ and parts external to the joint, often by an evident fluctuation within the cavity of the joint ; and should the patient fall, we often find the cavity of the arachnoid and of the pericardium loaded with serum, the latter often to the extent of many ounces.

Adhesive inflammation is one of the most frequent results of acute rheumatism. The cellular tissue surrounding the diseased articulation being not only found thickened, but also often infiltrated with a loose coagulable lymph. The tendinous sheaths and capsular ligaments also often offer the same alterations. After an indefinite time the effused lymph becomes organized, and in this manner parts are bound down and the motion of joints greatly and sometimes permanently impaired. The alterations of the synovial membrane are not the least curious of the changes which occur in rheumatic joints from adhesive inflammation, for this tissue is not only often thickened, but villous processes, like the papillæ of the tongue of herbivorous animals, only soft and red, and dipping into the depressions around the neck of the bone, are occasionally formed, which are not only intractable even to long treatment, but often render the amputation of the joint necessary. The strongest evidence of adhesive inflammation is, however, the immense effusion of lymph which often takes place in rheumatic pericarditis, sometimes covering the whole surface of the heart and pericardium with a layer of lymph half an inch in thickness, and whose irregular surface has been compared to a honeycomb, a calf's stomach, or to the rind of a pine-apple.

Suppurative inflammation is so rare a termination of even acute rheumatism that many writers have denied its existence altogether. Stoll, however, has noticed this termination, and many other physicians have observed the same fact sometimes in the muscles, but more commonly within the capsules of the joint. Of this last form of disease Chomel has seen three cases, Moreau one, Piorry two, and Cruveilhier three cases ; and to these Bouillaud and Macleod have made several additions.

Ulcerative inflammation is by no means unusual, sometimes perforating the capsular membrane or destroying the ligaments, but more frequently eroding the cartilages and the ends of the bones.

The chronic forms of rheumatism are principally achromatous ; and this is strongly seen in ulceration of the cartilages without the trace of a red vessel. Whilst the absorption of cartilage is going on, a remarkable change sometimes take place in the bones, which are sometimes enlarged, and almost eburnified from increased ossific deposit, causing not only a change of form in the articular extremity, but presenting a mechanical obstacle to the motion of the joint. When the hip-joint is affected, says Dr. Todd, the acetabulum becomes deeper and wider than natural, and the head of the femur flattened and expanded, assuming something of the shape of the turnip. In this diseased state the bones have been found by Dr. Macleod to contain urate of soda. Portal states also that he has found the bones so soft in rheumatism that they might be cut with a knife.

Symptoms.—Rheumatic inflammations may be acute or chronic, but the proportion of the latter is infinitely greater than of the former.

Acute rheumatism is a severe inflammation of the feet, or of the hands, or of the larger joints, as the wrist, ankle, knee, hip, elbow, and shoulder joint, or of one or more of these parts, and this is usually accompanied by a sharp inflammatory fever. These affections often constitute the whole disease ; but in a given number of cases, either with or without the subsidence of the articular inflammation, the heart or pericardium, or else the membranes of the brain, become the seat of the rheumatic inflammation. The proportion of persons whose heart is thus affected probably varies according to the treatment. Bouillaud estimates the number at more than one-half, or as 64 in 114 cases, and Dr. Macleod at one-fifth ; but even this latter calculation is probably in excess. The affection of the membranes of the brain is much more rare, so that the proportionate number is not determined.

In an attack of acute rheumatism the fever often precedes, by twenty-four or forty-eight hours, the inflammation of the joints ; but this is not constant, for in some instances the local and general symptoms are contemporaneous, while in others the inflammation of the joints is established before the accession of the fever.

The fever which attends acute rheumatism is well marked and striking. The chilliness or shivering with which, in common with other acute fevers, it is ushered in, speedily passes away, and is followed by great heat of the skin, and by copious but partial perspiration, almost invariably acid, reddening litmus paper, and of a disagreeable odour; the pulse rises to 90, 100, and 110, and is large, full, and strong; the tongue is greatly loaded with a white or yellowish-white mucus; the bowels sluggish; the evacuations dark and offensive; and the urine scanty, with a copious deposit of the lithates. There are many remarkable differences between this and ordinary fever, for it runs no given course, is not marked by changes of the tongue, nor by any great depressing action; while delirium and even headache are of rare occurrence.

The local symptoms which accompany the inflammation of the articulations are pain, heat, redness, and tumefaction. The *pain* is generally active and severe, although in a few cases it is latent,—that is, the patient is at ease, unless the joint or limb be moved. It has many degrees of intensity, being in a few instances trifling, but more commonly atrocious and agonizing, and though generally constant, it is sometimes intermittent. In all cases in which it exists, it is greatly augmented by pressure, so that the slightest touch—even the weight of the bed-clothes—is insupportable; and, by an inexplicable law, it usually somewhat remits during the day, and is aggravated at night. The *heat* of the inflamed joint is constantly increased, the thermometer indicating a temperature of 100, 105, or even more degrees. *Redness*, though not universally present, is nevertheless the rule of the disease, and the affected joint is surrounded by a rose-coloured flush, evanescent on the slightest pressure, yet returning on its removal. The *tumefaction* of the part caused by the effusion of serum into the synovial cavity, or into the cellular tissue and other parts surrounding the joint, is often great, generally indeed so considerable that the shape of the hand, the ankle, or other joint, is completely destroyed. In affections of the knee the patella is often more or less displaced, by effusion into the cavity of the joint; and this, together with the swelling of the external parts, renders it misshapen, rounded, and obliterates all the markings of its healthy state.

Such are the general and local affections in acute rheumatism, and at the height of the disorder it is difficult to conceive a more complete picture of helplessness and suffering than that to which they reduce the patient. A strong and powerful man, generally unused to disease, lies on his back motionless, unable to raise his hand to wipe the drops which fast flow from his brow, or the mucus which irritates his nostril. Indeed, he is so helpless, that he is not only obliged to be fed, but to be assisted at every operation of nature. The sweat in which he lies drenched brings him no relief; his position admits of no change; and if he sleeps, his sleep is short, and he wakes up with an exacerbation of suffering which renders him fretful, impatient, and discontented with all around him.

The duration of acute rheumatism is very various; in some cases both the fever and local pains are gone in three or four days, but in the majority of instances they continue till about the tenth to the fourteenth day, when the fever disappears and the pains begin to subside, and towards the close of the third week or the beginning of the fourth, the patient is recovered, and generally without injury to the joints affected. In almost all cases, however, the pain continues till after the fever is gone, and sometimes for a very long period afterwards. The patient, though recovered, is liable to relapse, and often suffers from it.

The symptoms which have been described, constitute the usual forms of acute rheumatism; but in a given number of cases this course is interrupted by the heart, the pericardium, or else the membranes of the brain becoming the seat of this severe affection.

About the middle period of an attack of acute rheumatism, and sometimes towards its close, the heart is often affected with rheumatism even when the original attack is not of the severest character. The symptoms which mark it are pains or soreness all over the chest, increased on pressing between the intercostal spaces, and also on taking a deep breath. The patient also is restless—his countenance anxious, and occasionally he coughs. On applying the stethescope to the chest, the bruit de soufflet is often heard loud and permanent, and evidently arising from some irregular contraction about the orifices of the heart, or else from some affection of the valves. Many pathologists, it has been stated, conceive we can determine the exact pathological state of the pericardium. Thus, if the inflammation be diffuse, we shall have a crackling sound, like that of new leather, the parts being dry; or if serum be effused, we shall find the heart moving in a larger space than usual. Again, if lymph be poured out, we shall have a rubbing sound; and lastly, if pus be poured out, it will be determined not only by the greater space in which the heart moves, but by the sudden collapse and rapid sinking of the patient.

The duration of this secondary affection is very various. If the disease be severe and neglected, the patient often dies in three or four days; under proper treatment it seldom continues beyond a week; but there are cases in which, either from relapse or other cause, it lasts for three weeks, or even a month, as in an instance now in St. Thomas's. If this attack be altogether neglected, and the patient survive, the pericardium either becomes adherent, or the valves of the heart become permanently diseased, and its ulterior effects are dropsies, asthma, or affections of the lungs, which baffle all the resources of our art, and consequently are among the most fatal maladies incident to humanity.

The rheumatic inflammation in a much smaller number of cases affects the membranes of the brain. In these cases the patient first complains of severe headache, and this is shortly followed by delirium, high fever, and rapid pulse, and in this state he may die in a few days, but more commonly he recovers. As the opportunities of examining those who have fallen from rheumatic metastasis to the head are few, it is perhaps our duty to give the results in three cases which occurred in the extensive practice of Dr. Watson. The first was a young woman, 17 years of age, who had acute rheumatism of the joints; afterwards a rheumatic metastasis to the chest, for which she was bled, when she became furiously maniacal and died. The vessels of the brain were fuller than usual, but its membranes were healthy. The pericardium was glued to the heart in several places, and where not adherent, was universally coated with a layer of rough reticulated lymph. In another case, a post-boy, aged 28, attacked with much fever, and rheumatic pains shifting from joint to joint, but without any swelling; a metastasis at length took place to the brain, when he rambled, refused his medicines, and after lying delirious for 10 days, he died. On examination the cerebral veins were gorged with blood; a considerable quantity of serous fluid was found beneath the arachnoid and in the lateral ventricles, while the mitral valve was covered with a row of bead-like warts. The other two cases are not dissimilar. Dr. Watson, from a consideration of these cases, is inclined to infer that the delirium is not a metastasis of the rheumatic virus to the brain, but a symptom merely of pericarditis; but this hypothesis can hardly be maintained, pericarditis being often met without any delirium or affection of the brain, while rheumatic affection of the brain has been met with without the existence of any pericarditis. The pathological phenomena, however, of the first case may render it doubtful whether the virus had caused mere deranged function of the functions of the brain, or whether the substance of the brain, from the increased quantity of blood, was diffusedly inflamed.

Chronic Rheumatism is generally a strictly local disease, without fever or any considerable derangement of the health; and the symptoms, consequently, when it occurs in the joints, are limited almost entirely to pain and to the different appearances caused by the effusion into the internal or external parts of the joint. In many cases, however, as in affections of the hip or shoulder-joint, there is no swelling, and pain is often wanting, except when the part is put into action, or when the patient gets warm in bed. It has been shown that chronic rheumatism more often attacks two similar joints than one, giving a symmetrical character to the disease; and very commonly both hands, both wrists, or both knees are affected, and with identically the same lesion and deformity. The larger joints, however, are exceptions to this rule, for it is rare that more than one hip, one shoulder, or elbow-joint, is affected.

Besides the joints, the different muscles of the body, their fascia, or tendons, are often the seat of chronic rheumatism, and there are few structures of this kind that entirely escape. The scalp, for instance, is often affected. The muscles of the eye are occasionally so; Stoll quotes one case in which the woman squinted while the disease lasted. Rheumatism of the face is by no means unfrequent, and the muscles of the larynx are occasionally affected, causing aphonia. Everybody is familiar with the rheumatic affection termed "crick in the neck;" it also affects the articulations of the clavicle and the intercostal muscles. Rheumatism of the abdominal muscles is by no means rare, the principal pain being at their insertion into the crista of the ilium. Lumbago is well known as an affection of the lumbar muscles, extending often to the ligaments of the sacrum. The insertion of the tendo Achillis into the os calcis is another seat of rheumatism, but no parts are more often or more painfully affected than the tendinous structure of the soles of the feet. These forms of rheumatism are seldom accompanied by any swelling or other external symptom.

The pain in chronic rheumatism is often latent, unless the part be moved, and then the agony is severe. In many cases it is quiescent during the day, but is extremely acute during the night. This pain has a great tendency to shift from joint to joint, often subsiding and again recurring. Redness is rarely or never present in chronic rheumatism.

The lesions of motion vary from mere stiffness to an entire binding down of the joint. In this manner the hip and shoulder may be so firmly fixed, that the arm cannot be extended or the leg raised. The knee and elbow joints are generally semi-flexed, and cannot be straightened; while the fingers, if straightened, cannot be bent, or if bent cannot be straightened. When the joint is fixed, the muscles of the limb often become atrophied, sometimes partially so. In a case now in St. Thomas's, the flexors of one hand are so feeble, and the extensors so powerful, that the fingers are turned backwards; while, in the other hand, the muscles being in an opposite state, the fingers of the other hand are clenched, the nails almost growing like those of a Hindoo devotee into the palm. The duration of chronic rheumatism is extremely uncertain; it sometimes disappears in a few hours or in a few days, but it may last many weeks or months, or even years.

Chomel has attempted to give the relative frequency with which different parts of the body are attacked with chronic rheumatism, and out of ninety cases he found the muscles of the body were affected eleven times; one side three times; the upper limbs twelve times; the lower limbs twenty-two times; the trunk eleven times; the vertebral column nine times; and some part of the trunk or limbs twenty-two times.

Diagnosis.—The only disease with which acute rheumatism, when attended with swelling and redness, can be confounded, is, perhaps, erysipelas. Chronic rheumatism is also often of difficult diagnosis when it attacks the intercostal spaces, being often confounded with leucorrhœal pains, or affection of the chest. It may also be confounded with many neuralgic affections, as well as with pleuritic diseases of the bones.

Prognosis.—The number of deaths from acute rheumatism returned for England and Wales hardly exceeds one thousand; whence it is manifest that this disease is seldom fatal, and perhaps the number of unsuccessful cases hardly exceeds one or two per cent. But although this disease is rarely immediately fatal, yet a considerable number of persons ultimately fall from diseases of the heart, apparently resulting from the action of the rheumatic virus. A very few deaths occur from chronic rheumatism, so that the numbers that fall bear but a very small proportion to those that recover.

Treatment.—Acute rheumatism is manifestly a highly inflammatory disease, the parts being red and swollen, and the blood drawn presenting a more copious layer of 'buff' than most other diseases, the proportion of fibrin, according to Andral, amounting sometimes to nine or more; we can hardly feel surprised that bleeding has been largely had recourse to. But, although bleeding has been extensively adopted, the profession is much divided as to the advantage derived from the practice.

Sydenham attempted the cure of acute rheumatism by bleeding, and he took ten ounces of blood on the first day, as much on the second, and he bled a third time a day or two afterwards, and three or four days after this he bled a fourth time. This was the early practice of our great master, but some years later we find he bled less and purged more, observing that repeated bleeding was too debilitating. This, however, is not the fullest extent to which bleeding has been carried, for Sauvage says that at Montpellier they bled in his time thrice a day, and to a great amount, and the result of his experience was that nature was the best physician. Bouillaud is perhaps the only modern physician who has adopted the system pursued at Montpellier; for in cases of no great severity he recommends four pounds and a half of blood to be taken in twenty-four hours, while in graver cases he takes eight, nine, and ten pounds of blood within the week. The advantages of this mode of practice, he affirms, are, that the disease does not become chronic, and that its duration is abridged from one to two weeks, the mean duration of his cases, reckoning from the time of their admission to the hospital being nineteen and a-half days. The objections to this practice are, first, that very little is gained as to time; again, that the loss of so large a quantity of blood is worse than the disease, for it would be felt by most persons all their lives; and lastly, that this mode of treatment appears to have caused in his practice an unusually large number of cases of carditis—a larger number, indeed, than has been witnessed by any other person in the profession.

Without entering upon the effects resulting from those who adopt a middle course, it may be stated that many practitioners in the present day hold that bleeding, while the inflammation is confined to the joints, neither shortens the disease nor renders it more bearable, and therefore, except in particular cases, they adopt a treatment almost exclusively by purgatives and opiates. The particular purgative perhaps is not of great moment, but at St. Thomas's Hospital, a drachm of the sulphate of magnesia, with ♏xv. of the tinct. hyoscyami, out of camphor mixture, every four or every six hours, has been found eminently efficient and a perfectly safe remedy. Its effects are to moderately purge the patient, and to assuage his pains, and about the tenth day, or shortly afterwards, all the symptoms abate; in the third week he is generally up, in the fourth week, he is for the most part well, and, except in a few cases, in which the articulations of the hand remain enlarged, and which are reduced by a few leeches, no bleeding need be had recourse to.

Under the purgative treatment, carditis and arachnitis are of rare occurrence, but in a very few cases they do occur, and the treatment is similar in both instances. Some blood, but not to a large amount, should be taken from the head in the one case, and from the chest in the other; this done, calomel should be given to affect the mouth, in doses of five grains, once or twice a day, or every six, or every four hours, according to the severity of the symptoms, and it almost uniformly happens that, when ptyalism is produced, the heart and the brain are immediately relieved. It is remarkable that mercury, although it appears the specific agent in rheumatic carditis or arachnitis, has no very marked beneficial effect in the purely articular forms of acute rheumatism, which is another analogy bringing this disease under the laws of morbid poisons.

There are a small number of feeble irritable patients, who suffer so severely from the pains of acute rheumatism that their minds wander, or they become hysterical; and in these cases small doses of opium, gr. ſs. to gr. j., every six hours, is the best treatment.

Antimony is a remedy which has been much praised in the treatment of acute rheumatism, and perfectly succeeds in a few cases, in moderate doses; more frequently perhaps it is given without any marked success. Bouillaud says, he has seen the antimonium potassio-tartarizatum given to the extent of 150 to 160 grains in ten days, but that its efficacy was not greater than in the ordinary mode of small doses, while it often disagreed and produced derangement of the digestive organs.

The treatment of chronic rheumatism varies, according to Dr. Macleod, as it assumes one of the five different forms he assigns to it, or according to the tissue it affects; but rheumatism scarcely admits of a strict analysis into tissues, and perhaps the more practical rule is, that the treatment varies according to the joint affected. If the shoulder-joint be the part diseased, potassii iodidi, gr. viij. out of camphor mixture, ter die is generally efficient, especially if assisted by a blister. The elbow-joint yields even with more certainty to the same treatment, and often without the blister. The wrist and small joints of the hand, yield to the neutral salts, as the sulphates of soda or magnesia; but, if very chronic and constitutional, perhaps more often to turpentine, as olei terebinthinæ, ♏ x. to ʒ j., ter die, or to grains x. of the Canadian balsam, three times a day.

If the hip-joint be affected, and the disease is very acute, it is best treated by the disulphate of quina, gr. v. 6^{tis} vel 4^{tis} horis; if this disorder be only slightly acute, the warm bath, with small doses of mercury, or of potassium iodidum, succeed best. and if these fail cupping and blisters may be recommended, but they do not often greatly relieve the patient. If the knee be affected, mercury, leeches, and poultices, or else cold lotions, are the best remedies; but this latter disease is often long protracted and of difficult cure, whatever means we may adopt. Of all the effects of chronic rheumatism, however, the affections of the ankle joint are the most intractable, and no treatment can be spoken of with confidence; but, take it altogether, the turpentines are the most successful remedies. In cases of lumbago, if the disease does not yield to purging, it very rarely resists cupping on the loins; and if that fails ℥ ſs. of sp. terebinthinæ twice a week may be tried.

There is one remedy possessed of great fame in the cure both of acute and chronic rheumatism,—or colchicum; and Dr. Macleod speaks of it almost as a specific in diseases of the capsular membrane. In many well-marked diseases of this class, however, it has eminently failed, and after an extensive trial, we conceive it has not been found more beneficial than the more simple purgatives, while to some constitutions it seems eminently pernicious.

In chronic rheumatism much local treatment has been employed, but hitherto without any very satisfactory result; the warm bath seldom affords relief. Dr. Gower introduced the practice of wrapping the patient up in oiled silk, and applying heat by means of a spirit lamp, but this treatment was attended with little success. At the present moment wrapping the affected part in cotton wool, and then wrapping it up in oiled silk, is practised, and it is supposed with more success; while, among non-professional practitioners, an extensive series of experiments of wrapping the patient up in a cold wet sheet, and applying heat by means of a feather bed, &c., is going on, but with a success still problematical.

The diet of the patient, in acute rheumatism, should be strictly limited to slops and light puddings, and even in many chronic cases it is desirable it should be confined for a short time to puddings and white fish.

Of Podagra (πους a foot, and αγρα seizure, arthritis from αρθρος a joint. Gout).

Gout is an inflammation affecting the same tissues as rheumatism, and is likewise marked by the same mobility from part to part, and has also the same want of tendency to ulceration. It differs from Rheumatism, however, in the disposition of the inflamed parts to deposit a singular substance, or the urate of soda, and also in its tendency to affect the stomach, the alimentary canal, and the bladder, rather than the heart and head. The common appellation, gout, is derived from the French *goutte*, a drop, and springs from the same physiology as gave rise to the origin of the term rheumatism. 215 cases are said to have died of this disease in England and Wales in 1839.

Remote Cause.—Two theories have been imagined to explain the remote causes of gout. The one is, that it results from general causes, as atmospheric vicissitudes, errors in diet, &c., " podagra Bacchi Venerisque filia," is a received maxim, and, according to Sydenham, it occurs chiefly in those who have passed their lives in ease, voluptuousness, and high living. The other is suggested by Rostan, who, observing the many different limbs it simultaneously affects, its rapid transition from joint to joint, and its singular deposition of the urate of soda, concludes that there is something more in gout than mere simple inflammation occurring in a particular diathesis, and he hints at a specific cause, having probably its seat in the solids. Sydenham, it is well known, considered the cause to be a peccant state of the fluids.

Predisposing Causes.—A few children have been attacked with gout at the early age of seven years: it very rarely, however, occurs before puberty, but is seen in both sexes under 20. Many cases occur between 20 and 30, but the period of greatest liability is perhaps from 30 to 50. After this the chances of exemption increase with age, probably from the more temperate habits of advanced life. At whatever age, however, gout appears, every attack establishes a greater disposition to another. Women often suffer greatly from gout, but not in an equal degree with men.

It is generally supposed that gout is hereditary; and in many instances it is so, whether the party adopt the habits of intemperance of his ancestors, or whether he be abstemious in his mode of living. In some families it attacks only alternate generations, following the law of *atavism*. Sydenham sums up the predisposing causes by saying, that it destroys " more rich than poor, and more wise men than fools."

Pathology.—The theory of gout is similar to that of rheumatism; or the gouty virus may produce either *neurotic* pains or else *inflammation*, and in either of these forms has the same tendency to affect similar limbs and similar joints, and also to fly from one part to another with terrific violence. This erratic property of gout is so well known, that Gay has thus popularly described it:—

> " Next gout appears, with limping pace,
> Pleads how he shifts from place to place;
> From head to foot how swift he flies,
> And every joint and sinew plies;
> Still working when he seems supprest,—
> A most tenacious, stubborn guest."

When the gout assumes an inflammatory character, it produces all the forms of articular inflammation which have been described in rheumatism, and these inflammations attack nearly the same parts, as the bones, cartilages, synovial membranes, bursæ, ligaments, muscles, tendons, and aponeuroses. These inflammations have nothing to distinguish them from rheumatism, except the singular pathological phenomenon of a tendency to the deposition of the urate of soda, a discovery we owe to the late Dr. Wollaston.

It is not determined in what form of inflammation the urate of soda is most frequently deposited, but occasionally it appears to be nearly the sole secretion from the affected part, nothing being seen on the poultice but this salt in a more or less fluid state. It is equally secreted from the joints of the toes or fingers, and probably from all their different tissues. Portal gives a case in which the articulations of both hands presented deposits of urate of soda, both within the capsules of the joints, and externally among the ligaments, while the tendons of the extensor muscles of the fingers were almost destroyed. In the Hunterian Museum of Glasgow there is a finger from a gouty hand, with a joint opened and bent upon itself, showing not only a deposition of the salt, but an erosion of the cartilages; also another in which the joint is full of this peculiar secretion, and a third in which the joint is everywhere invested with it. In the Museum of St. Thomas's Hospital there is a specimen in which the femoral cartilage of the knee-joint is coated with it, as if smeared over with plaster of Paris; and another in which it is deposited on the ligaments of the extensors of the hand. Guibert gives a case in which the metatarsal articulation of the great toe was surrounded by urate of soda of a rose tint, and on the inside of the foot, in the cellular tissue, was an abscess containing urate of soda, making its way to the surface; on opening the joint the same substance was also found, and on cutting through the tendons, pieces of urate of soda were distinctly seen between the fibres. Simon gives an account of a gouty skeleton, of which the bones were so completely anchylosed that even the brazen skeleton dedicated to Hippocrates in the temple of Delphos could not have been more inflexible. The bones, also, affected with this disease have been found swollen, and sometimes so soft as to have been easily cut by the scalpel.

The urate of soda is deposited first in a white fluid state, like a mixture of chalk and water, and often in such quantities that a poultice, though applied several times a day, has been covered with it, and that for several days together. It afterwards hardens and forms what, from their colour and appearance, have been termed *chalk-stones*, often superficial and of considerable size, so that when the skin has ulcerated a patient has been said in one case to have scored his game of cribbage with his knuckle, and in another to have written on the table with the *chalk* penetrating through the ulcerated tips of his fingers.

The arteries are often found ossified in gouty persons, and especially the coronary arteries of the heart; bony matter also has been often found deposited on the valves, and around the orifices of the heart, and hence the tendency of gouty patients to apoplexy and to asthma. The appearances which exist when a patient has fallen from gout of the stomach, bladder, or intestinal canal, have not as yet been described.

Symptoms.—The symptoms of the gout vary according as it attacks the joints, the stomach, or the intestinal canal, but the proportionate frequency with which these different parts are attacked is not yet ascertained. It may be acute or chronic, and when the viscera are affected, it has been termed irregular, retrocedent, or misplaced. Sydenham was himself a great sufferer from this affection, and laboured under it for more than 34 years, and thus describes an acute attack or fit.

" It comes on a sudden towards the close of January or beginning of February, giving scarce any sign of its approach, except that the patient has been afflicted for some weeks before with a bad digestion, crudities of the stomach, and much flatulency and heaviness, which gradually increase till at length the fit begins." "The patient goes to bed, and sleeps quietly till about two in the morning, when he is awakened by a pain, which usually seizes the great toe, but sometimes the heel, the calf of the leg, or the ankle. The pain resembles that of a dislocated bone, and is attended with a sensation as if water just warm were poured upon the membranes, and these symptoms are immediately succeeded by a chilliness, shivering, and slight fever. The chilliness and shivering abate in proportion as the pain increases, which is mild in the beginning, but gradually grows more violent every hour, and comes to its height towards evening, adapting itself to the numerous bones of the tarsus and metatarsus, the ligaments whereof it affects so as sometimes to resemble a tension or laceration of those ligaments, sometimes the gnawing of a dog, and sometimes a weight and coarctation or contraction of the membranes of the parts affected, which become so exquisitely painful as not to endure the weight of the clothes, nor the shaking of the room from a person walking quickly therein; and hence the night is not only passed in pain, but likewise with a restless removal of the part affected from one place to another, and a continual change of its posture. Nor does the perpetual restlessness of the whole body, which always accompanies the fit, especially in the beginning, fall short of the agitation of the gouty limb. Hence numberless fruitless endeavours are used to ease the pain by continually changing the situation of the body and the part affected, which notwithstanding abates not till two or three in the morning, that is, till after 24 hours from the first approach of the fit." "And being now in a breathing sweat he falls asleep, and upon waking finds the pain much abated, and the part affected to be swelled; whereas before only a remarkable swelling of the veins thereof appeared, as is usual in all gouty fits."

"The next day, or perhaps two or three days afterwards, the part affected will be somewhat pained, and the pain increase towards evening, and remit towards break of day;" and "what we call a fit of the gout is made up of a number of these small fits; at length the patient recovers, which, in strong constitutions and such as seldom have the gout, often happens in fourteen days, and in the aged, and in those who have frequent returns of the disease, in two months; but in such as are more debilitated either with age, or the long duration of the distemper, it does not go off till summer advances."

In aggravated cases it attacks both feet, the hands, wrists, elbows, knees, and other parts; sometimes bending the fingers crooked and motionless, and at length "form stony concretions in the ligaments of the joints, which destroying both the scarf-skin and the skin of the joints, stones not unlike chalk, or crabs' eyes, come in sight, and may be picked out with a needle. Sometimes the morbific matter is thrown upon the elbows, and occasions a whitish swelling almost as big as an egg."

"During the first fourteen days the urine is high coloured, and after separation lets fall a kind of red gravelly sediment, and not above a third part of the fluids taken is voided by urine, and the body is generally constipated during this time. The fit is accompanied throughout with loss of appetite and chilliness of the whole body towards the evening." When the fit is going off a violent itching seizes the foot, especially between the toes, and the skin peels off as if the patient had taken poison.

When the disease has become chronic, or, as Sydenham terms it, inveterate, "after yawning, especially in the morning, the ligaments of the bones of the metatarsus are violently stretched, and seem to be squeezed with great force with a strong hand. And sometimes, though no yawning has preceded, when the patient has disposed himself to sleep, he feels a blow on a sudden as if the metatarsus were breaking in pieces by a large stick, so that he wakes crying out with pain. The tendons of the muscles of the tibiæ are sometimes seized with so sharp and violent a convulsion or cramp, that if the pain it occasions were to last only a short time, it could not be borne with patience."

After many racking pains, the following paroxysms become less painful, when, "instead of the usual external pain, a certain sickness, a pain in the belly, a spontaneous lassitude, and sometimes a tendency to diarrhœa succeeds." Besides the pain and sickness, the patient becomes lame and almost incapable of motion, and, like the late Sir Joseph Banks, is perhaps obliged to be wheeled or carried from room to room. The patient is not only reduced to this helpless condition, but, to complete his misery, his mind sympathizes with his body." "For every paroxysm may be justly termed a fit of anger, the rational faculties being so enervated by the weakness of the body as to be disordered on every trifling occasion, whence the patient becomes as troublesome to others as he is to himself.

Another form of chronic gout is *atonic gout*, or when the joints enlarge and the tissues and ligaments become thickened, and the seat of various effusions, so as often to distend and even to dislocate the bones, and yet if the patient be kept quiet he suffers no pain. The general symptoms, however, are most distressing, the patient suffering from loss of appetite, indigestion, sickness, nausea, flatulence, acid eructations, pains of the stomach, cramps in the legs, and in various parts of the body; also great dejection of spirits, vertigo, palpitation, fainting, asthma, and perhaps from stone or gravel, and these perhaps continue with occasional intervals during the remaining life of the patient, who is satisfied he has the gout *flying* about him, and that he should be well if he had a regular fit.

In the course of this disease there may be a metastasis to the stomach or other part, and the affection is now termed *retrocedent* gout, the pain in the joints being trifling, or having entirely subsided. When the metastasis is to the stomach or intestines, it may be either of a spasmodic or inflammatory character. The spasmodic is the most frequent, and in this case the patient is seized with violent pains in the stomach, with great faintness, coldness of the extremities, and a quick, small, and scarcely perceptible pulse, accompanied with much flatulence, acidity, or vomiting. If, on the contrary, the attack be of an inflammatory character, the pain is perhaps equally great, but is increased on pressure, and there is more re-action, some fever, a fuller pulse, with vomiting, and perhaps obstinate constipation. The duration of these attacks is short, as the patient must be quickly relieved, or quickly perish. Besides metastasis to the stomach and intestines, this retrocedence may take place to other parts, as to the testicle, bladder, rectum, or to the head, and in the latter case the patient may die apoplectic. The transition of the gouty virus is often marked by a pain shooting along the nerve as sudden and as rapid as a galvanic shock, and so violent as to have been compared to stabbing with a knife. Gout also, besides being transferred from part to part, often alternates with asthma, so that when the patient is free from the one disease he labours under the other.

But the miseries of the gout do not end here; for Sydenham says, "I made bloody urine, and did so whenever I walked much, or was carried in a coach over the stones, though the horses went slowly. The urine I voided on these occasions, though it looked very bad at the time of making, so as to resemble pure blood, yet soon after it became clear at the top like natural urine, the blood falling to the bottom by itself in clots." A description which renders it probable that his urine was loaded not only with blood, but also with uric acid.

Diagnosis.—The diagnosis between gout and rheumatism is often exceedingly difficult, so much so that nosologists have given a mixed class, or rheumatic gout. Mr. Hunter warmly opposed this compound appellation, for in his opinion no two distinct diseases, or even distinct diatheses, can co-exist in the same constitution; a law, it must be admitted, to have many exceptions.

Prognosis.—Every assurance office objects to a gouty person as liable to a disease indicative of excessive indulgence in the pleasures of the table; or at least to a disease tending to shorten life, from the wear and tear it occasions of the constitution; and the objection is unquestionably founded; for although a few persons may reach advanced age notwithstanding its repeated attacks, yet many fall prematurely from this affection, or from the asthma, affection of the heart, apoplexy, or from the accidents that helplessness and debility render the patient liable to.

Treatment.—The gout consisting essentially in inflammation of the joints and their surrounding tissues, it might be supposed that this disease would be best treated by bleeding, and blood has been drawn to a considerable extent, but without any corresponding benefit. "Bleeding," says Sydenham, "is not to be used either by way of preventing an approaching or easing a present fit, especially in the aged, for, though the blood that is taken away resembles pleuritic or rheumatic blood, yet bleeding is found to do as much mischief in this as it does good in those;" "and bleeding in the interval, though long after the paroxysm, is found to occasion a fresh fit." The experience of Barthez, of Guibert, and Hallé entirely coincides with that of Sydenham, for however freely employed (and in some instances 70 ounces have been taken away in a few days), they say bleeding does not afford that relief to to the local pain and inflammation which might have been expected, while the restlessness, debility, and mental depression, are often rendered truly distressing. In the present day bleeding is generally restricted to two cases,—or leeches to the part where the inflammation rises so high, or is so chronic, as to threaten the patient with the permanent loss of the use of some joint; and also to cases of inflammatory metastasis to the stomach or other internal organ, when leeches are absolutely necessary.

Sydenham was as great an enemy to purging as he was to bleeding; and he says, "I am abundantly convinced, from much experience, that purging either with mild or strong cathartics, whether it be used during the fit, or in its declension, or in a perfect intermission, or healthy state," "endangers the life of the patient by hurrying on to the viscera, which were quite safe before." The objection taken by Sydenham to purgatives lies certainly against those in use in his day, and which were of the most drastic kind. But it may be laid down as a rule that the class of neutral salts are not only safe, but efficient in relieving, though perhaps not of curing, gout. The theory on which they are prescribed is, that the alkaline base of the neutral salt is absorbed, and combines with the insoluble urates deposited in the joints, forming a soluble sub-urate, which can readily be absorbed; and again, more alkali being sent to the kidney, that organ is now enabled to remove more uric acid, in a soluble state, from the system than under ordinary circumstances. The salts the most in use are the sulphates of magnesia or of soda, and especially the former, and half a drachm to a drachm should be given every eight, six, or four hours, according to the state of the bowels, and the acuteness of the symptoms. It is also necessary to give some relief to the patient from his excessive suffering, and an opiate should be added, as the tinct. of hyoscyami, syrup of poppies, or some preparation of opium. This method relieves the patient and shortens the paroxysm; but when the relief is complete it should be abandoned, for sometimes the gout will return even under its use.

Colchicum or meadow-saffron was introduced as a specific in gout; and the "eau médicinale," as long as it was a novelty, and acted upon the imagination, occasionally shortened or removed the paroxysm as by a charm. A more widely-extended experience, however, has shown it to have little influence over the disease while in some instances it has been followed by most alarming consequences, acting upon the stomach and bowels with all the virulence of an active poison. It is still however used, and is valuable for its purgative qualities, although not for its specific effects, and may be given as an extract or tincture, or as a wine combined with some form of saline draught.

Mercury, from its power of absorbing many periosteal nodes, has been often employed with a view of removing the deposits of urate of soda, or the chalk-stones; but experience has shown this to be dangerous practice, for, if pushed to any extent, not only have the chalk-stones not been removed, but in two cases the patient has appeared to have fallen in consequence.

If acute gout should have retroceded, and the stomach or intestinal canal be inflamed, leeches should be applied to the abdomen or epigastrium, followed by a poultice, while the internal remedies should be the neutral salts with the tinct. hyoscyami 6^{tis} vel 4^{tis}, and it is very rare that more active medicines are necessary.

In chronic gout the treatment by saline purgatives and opiates is the same; but in *atonic* gout some light tonic medicine may be added, as 5 to 10 grains of the citrate of iron, or a drachm of the tinct. aurantii, and the menstruum may be the aqua menthæ pip. or the infusum aurantii comp. A large number of these cases, however, though the general health is improved by this treatment, are often altogether unrelieved, as to the local symptoms, and are often quite unable to assist themselves. In these instances the turpentines appear to be beneficial, as spruce beer, or the Canadian balsam, gr. v. to x. ter die, or the olei terebinthinæ ʒ j. out of an effervescing draught once or twice a day. Sydenham's method, or by manna, may also be tried.

If the chronic or *atonic* gout should become retrocedent, and the stomach and intestinal canal be the seat of the spasmodic form of the disease, Sydenham strongly recommends laudanum should be exhibited;

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but perhaps the following draught is more efficacious: mist. camphoræ ʒ x., sp. ætheris sulphurici comp. ʒ j., confectio opiata ʒ fs., tinct. cardamomii ʒ j., and perhaps half a drachm of the sulphate of magnesia, to remove from the stomach any undigested matter which may remain as an irritating cause. This should be given every hour till the patient is relieved; and while it is being prepared, hot brandy and water should be freely administered, and hot cloths applied to the abdomen, as well as hot bottles to the feet.

Sydenham recommends, from experience in his own case, large doses of manna in all cases of what he terms "bloody urine."

With respect to any local treatment during the fit, Sydenham says, "if outward applications be inquired after to ease the pain of the gout, I know of none, though I have tried abundance both on myself and others, and I have laid aside the use of topics for many years." It is generally admitted that cold is dangerous, while warmth is productive of little relief. In some instances the urate of soda is deposited in such abundance that the skin ulcerates, and the salt is discharged in considerable abundance in a fluid state. It might appear the right practice to apply a poultice and encourage the discharge, in order that by its entire removal the joint might be saved. This, however, is very dangerous practice, for the discharge is so debilitating that two patients appeared to have died from this mode of treatment. It is much safer to wait till the chalkstone is concreted, and then operate for its removal. With respect to the use of cold water, the practice is as old as Harvey, and subsequently it has been adopted and abandoned by many practitioners. Dr. Parry had at one time two cases who had attempted to cut short the fit by plunging their feet in cold water. The relief was instant, but in a few hours both were dead of apoplexy. The recent fatal result of this remedy in Sir Francis Burdett's case will not soon be forgotten.

As diet appears to have a great influence in the production of gout, so we should imagine it should have great influence in its removal; and, during the fit, it should be slops and light puddings, and afterwards white fish, till the paroxysm has terminated. This disease is so distressing that many persons are inclined severely to diet themselves during the interval. Sydenham says that a milk diet, or drinking milk as it comes from the cow, or boiled without adding anything to it, except perhaps a piece of bread once a day, had been much used for twenty years past in his time, and done much service in abundance of gouty patients. But on quitting it and returning to the mildest and tenderest diet of other persons the gout has immediately revived; and he adds, many cannot bear this regimen. An entirely water regimen he considers hurtful. His recommendations are, that we should be early to bed, keep the mind free from disquietude, live with the greatest moderation, clothe ourselves warm, and ride on horseback. One other point with regard to treating the patient during the fit, is, if it be necessary to move him either on account of his restlessness or other cause, that this be done with great care and tenderness by the attendants; for although the pain may be latent while the parts are quiet, yet the least shock often causes the most excruciating agony.

The irritable state of mind of the patient during the paroxysm has been mentioned; and it is well known that slight moral causes will often produce a fit, while powerful emotions have sometimes cured one. There are many instances of persons confined to their beds with gout starting up and running away on an alarm of "fire" being raised. Dr. Rush gives the case of an old person whose son by some accident drove the shaft of his waggon through the window of the room where he was lying, when, forgetting his crutches, he leapt out of bed, and was found by his wife angrily walking up and down the room.

Elementary Principles of Medicine.

It is quite essential, therefore, the minds of gouty patients should be kept as tranquil as possible.

ORDER III.—OF TUBERCULOMA.—(*Tuberculum*, a small tumor. Scrofula.)

Tuberculoma is a peculiar morbid substance or growth infesting every organ and tissue of the body, and more especially the lungs, causing phthisis or consumption; but, wherever found, it follows, with little exception, the same laws in its development, course, and fatal termination. After inflammation this is the most important of the elementary forms of disease, both from the great number of persons it affects, as well as from its destructive tendency; for it is probable that every fourth or fifth death in England and Wales takes place from this disease having formed in some one or other organ or tissue of the body. Tuberculoma of the lungs, or phthisis, the more leading disease of this class, was unquestionably known to Hippocrates; but the laws of this substance, and the changes it undergoes, appear to have been first determined by Cruikshanks in 1790, and his opinions have been adopted and extended by Laënnec and Louis, so as to be generally received by most pathologists of the present day.

Remote Causes.—There is hardly any subject more interesting in medicine than the remote causes of tuberculoma. The broadest fact already established on this point is, that the domesticated animal is more liable to tubercular disease than the same animal in a wild state. The stabled cow, the penned sheep, the tame rabbit, the monkey, the caged lion, tiger, or elephant, are almost invariably cut off by tubercular affections. In man the same law appears to prevail, or in proportion as his habits of life are artificial so is his tendency to tubercular disease. This is strongly seen in the mining districts of Cornwall and Devonshire: for although those counties are considered among the most healthy portions of Great Britain, yet one-half of the whole number of the miners deprived of air and light die of phthisis. The Reports of the Registrar-General also show that, comparing the deaths from phthisis among the agriculturists and among the inhabitants of towns, the latter die in an increased ratio of 24 per cent. over the former; yet it is generally supposed that the dietary and general comforts of the townsman are greater than those of the countryman. Among the townsmen also it is determined that there are certain classes of men more predisposed to phthisis than others, as those workmen who suffer great vicissitudes of temperature, or who breathe an air loaded with particles of dust: as bakers, needle-grinders, gun-flint makers, cotton and wool carders, and bricklayers' labourers, and in this class of persons the disease has acquired the epithet of the "grinder's rot." It would appear also, from the great numbers that fall in the Foot Guards, compared with the population generally, that the night air must be greatly injurious. A more minute analysis of the numbers that die of phthisis in the different ranks and classes of life is greatly to be desired in illustration of the remote causes of phthisis. The late Professor Coleman was of opinion, that by confining the horse in a dark and dirty stable, and by feeding him on bad provender and neglecting to clean him, he could produce phthisis in that animal at will; and similar causes will probably be found to produce similar results in man. When, however, we consider how many persons there are who carry cleanliness to excess, whose diet is most studied, and whose every exercise is directed to health, and who nevertheless die of phthisis, it is plain that some more secret and hidden circumstance still remains to be discovered to account for the existence of tubercular disease in this country.

It has been supposed that the tendency to tubercular disease was limited by latitude,—that it never appeared to the south of the Mediterranean, and consequently that it must have a local origin. But this does not appear to be the case, for the returns of the army have shown, to the astonishment of everybody, that phthisis is more frequent in the West Indies than even in this country.

Mortality by Phthisis Pulmonalis per 1000 White Troops.	Windward and Leeward Command.	Jamaica.	Gibraltar	Malta.	Ionian Islands.	Bermuda.	Canada.	Nova Scotia and New Brunswick.	Cape of Good Hope District.	Dragoon Guards, and Dragoons serving at Home.	Civil life in England and Wales, according to Registrar-General's Report.	Naval Force, Mediterranean.
	12	13	$6\frac{5}{10}$	6	5	$8\frac{9}{10}$	$6\frac{5}{10}$	7	$5\frac{5}{10}$	$5\frac{5}{10}$	4	

It would appear, then, from these tables, that England and Wales were more exempt from phthisis than many countries which, from their higher temperature, have hitherto been supposed to enjoy a remarkable exemption from this complaint. Another unlooked-for result from these tables is the entire refutation of the hypothesis that paludal districts are in an eminent degree exempted from phthisis; since England and Wales, the Cape of Good Hope, Canada, and Malta, countries either the driest or the best drained, and consequently suffering the least from paludal diseases, are actually those countries the most free from phthisis. Another general deduction of the influence of climate is, that phthisis is most frequent in low and damp situations; while it is far less so in the mountainous districts of all countries. Again, in whatever climate the disease breaks out, it is the opinion of many pathologists that its course is most rapid if the patient remains in that country; thus the late Dr. Hennen's experience convinced him, that when the disease broke out among our troops on the shores of the Mediterranean, that no other chance remained of prolonging the patient's life than by sending him at once back to this country. It must be admitted, however, that this law is anything but proved.

To those who consider variations of temperature, and the vicissitudes of the weather generally, as the great causes of phthisis, it will appear remarkable that the number of deaths in each season from this disease is nearly equal. Thus, according to the Registrar-General's Report for the year 1839, of 21,827 deaths from phthisis 5600 took place in winter, 5778 in spring, 5501 in summer, and 5148 in autumn. The influence of temperature, however, over the disease, according to the idiosyncrasy of the patient, is remarkable: for many survive as long as the weather continues warm, and die as soon as it changes to cold, while others suffer only slightly as long as the weather is cold, but perish as soon as it becomes warm.

It being impossible to connect phthisis in the present state of medicine with any given cause, or series of causes, another mode of viewing it presents itself; and that is, looking to the peculiar course many cases of phthisis run, the consecutive diseases it sets up, as fatty liver and ulceration of the intestines,—diseases certainly not a consequence of mere debility,—whether it may not result from the action of a morbid poison, rather than from any combination of general causes? The most general conclusion perhaps we can come to is, that the agent, whatever it may be, is a depressant of vital action; and that whatever tends to lower the system, as profuse evacuations, excessive depletion, scanty diet, insufficient clothing, unhealthful situations, or depressing passions, may become the predisposing cause of this disease.

Predisposing Causes.—The tendency to the formation of tubercle is not equally great in all parts of the body, nor at all periods of life. Tubercle of the brain, the bones, and of the mesentery, is most common in infancy, childhood, and early adolescence. But tubercles of the lungs, which form so large a portion of all these affections, although they have been found in the fœtus, and at every period of life up to 80, yet it will be seen by the following tables from Bayle and Louis that it is most frequent between the ages of 20 and 40; or there died from phthisis from

Years of Age.	Bayle.	Louis.	Total.
15 to 20 . . .	10	11	21
20 to 30 . . .	23	39	62
30 to 40 . . .	23	33	56
40 to 50 . . .	21	23	44
50 to 60 . . .	15	12	27
60 to 70 . . .	8	5	13
	100	123	223

Of ages younger than 15 there died of this "canker of the bud," according to Papaltoine, out of 408 children,

Age.	Died.	Age.	Died.
At 2 years or less	72	At 9 years .	16
3 . . .	64	10 . . .	18
4 . . .	46	11 . . .	12
5 . . .	35	12 . . .	24
6 . . .	32	13 . . .	16
7 . . .	29	14 . . .	11
8 . . .	24	Age not noted .	14
			413

Sex has some influence in the production of phthisis, but not to any great extent, for out of 118,584 cases that died in England and Wales in 1838-1839 of that disease, 56,041 were males, and 62,543 females.

Of either sex *form* appears to give a marked predisposition to phthisis, the narrow-chested high-shouldered person being much more commonly its victim than those possessed of a more broad and capacious chest. Still the best formed persons often fall from it. The softer tissues also give many indications of a tendency to this disease; and most physicians are agreed that a soft flaccid habit of body—a remarkable clearness of complexion and softness of the skin—an eye of unusual pearly lustre—the senses and mental powers unusually acute—and a tumid upper lip, are all threatening marks of liability to this class of disease. If form gives a predisposition to phthisis, we can hardly feel surprised, as form descends, that tuberculoma should be popularly considered to be *hereditary* and to run in families. Louis, however, affirms, that in one-tenth only was he able to trace any parental taint of the disease.

With respect to *social* position, it is well ascertained, and on an extensive scale, that although the upper classes often suffer from phthisis, as the "fairest apple hangs on the highest bough;" still that the probability of life is greatly reduced from a tendency to tubercular diseases (especially among the children) in the lower classes resident in towns, who die, according to Dr. Alison, in Scotch towns, in the enormous disproportion of 45 or 50 to 5 and even 3, as compared with the agriculturists and upper classes.

Race has an influence in the production of phthisis. In this country the tendency of the Creole and Negro to phthisis is notorious. Even in the West Indies the black races are by no means exempt from this disease, and according to Mr. Rufz, the Creoles are remarkable for dying of it in large numbers in Martinique. This is the more unlooked for because as children they live almost in the open air, bathe daily, or still more frequently, and are singularly cleanly in their persons. He remarks also that the women of Martinique suffer in a large proportion, and yet the use of corsets is unknown among them.

Among the predisposing causes, says Laënnec, of phthisis, I know of none more certain than the *depressing passions*, especially when they are profound and long indulged; and this perhaps is the cause of the greater prevalence of this disease in larger towns, where bad habits and bad conduct are more common, and often the cause of those bitter regrets which neither time nor consolation can assuage. He adds, I had under my own eyes for ten years a most striking example of the influence of melancholy in the production of phthisis. There existed in Paris for that space of time a nunnery of a new foundation, and which had not been able to obtain from the ecclesiastical authorities anything but a temporary tolerance on account of the severity of its rules. Their alimentary regimen, although extremely severe, was still not beyond the powers of nature; but the spirit of their rules directing their minds to the most terrible truths of religion, as well as compelling them to resign themselves in everything to the will of the abbess, produced effects as sad as unexpected. These effects were the same in all. At the end of two months' sojourn in this house their menses were suppressed, and in a month or two afterwards symptoms of phthisis appeared. As they had not been allowed to take the usual vows, I intreated, as soon as this was the case, that they would leave the house, and all who followed this advice recovered. But during the ten years I was physician to this establishment, the members were renewed twice or thrice, with the exception of the superior, the tourière, the sisters who had the care of the garden, of the kitchen, and of the infirmary, or of such as had more frequent intercourse with the city, and consequently greater distraction. The rest died of phthisis.

Pathology.—Mr. Cruikshanks, in the year 1790, affirmed that tubercular matter had three stages, or that when first deposited in the lung it is a grey semi-transparent substance; that in a subsequent stage it becomes yellow, opaque, and hard, like particles of cheese; while, in a third stage, it melts down into common pus. These three stages are very generally received as marking the progress of tubercle, and its more detailed laws are as follow.

Tubercular matter, when first deposited, is a grey, semi-transparent, gelatiniform fluid—the fluid particles of which, after an uncertain time, are absorbed, so that the gelatiniform matter becomes hardened. It may be deposited in a variety of forms; that is, it may be granular or in large masses, or it may be infiltrated in an amorphous state into the loose substance of the lung, or deposited in a loose state at the free surface of a serous or mucous membrane. In the lungs, the granular form is the most frequent; and in this state the following changes may be plainly demonstrated. The gelatiniform granules are of a spherical shape, about the size of small shot, and often in such prodigious numbers that the broken or torn surface of the lung has a granular appearance, and hence they have been termed miliary granulations. The duration of this first gelatiniform stage is not determined, but after an uncertain period, as a few days, a few weeks, or a few months, a small opaque yellowish white spot is seen in the centre of each granule, and this increases from the centre to the circumference, till the whole granule is converted into an uniform opaque yellowish white matter of the consistence of cheese, and this is the form in which tubercular matter is most frequently met with, and is termed "crude tubercle."

The crude tubercle has been analyzed by Thenard, who determined it to consist of animal matter 98 parts, and of carbonate of lime, muriate of soda, and phosphate of lime, with a trace of oxyde of iron 1·85. But these proportions appear greatly to vary; for a tubercle having a cretaceous character consisted of animal matter only three parts, and of saline or cretaceous matter 96 parts. When viewed under a powerful microscope, crude tubercular matter has elementary forms which distinguish it from every other substance, and is thus described by Lebut. It consists of molecular oval or circular globules, which vary from $\frac{1}{800}$ to $\frac{1}{400}$ of a Paris line in diameter, and are consequently much smaller than the blood globules. These are united by a transparent cellular tissue, forming cells, which, as the disease advances, disappears, and is supposed to have become atrophied. There are, besides, a number of angular corpuscles, $\frac{1}{100}$ to $\frac{1}{150}$ of a millimetre, irregular in form, and often containing a number of granules in their substance, which is yellow, opaline, and striated. It is these corpuscles which give to yellow tuberculoma its peculiar character.

The duration of the stage of crude tubercle is uncertain, but at length a third and last stage forms, marked by another vital process commencing in the centre of the granulation, by which the tubercular matter is softened and converted into pus, and from the centre this process extends to the circumference, till the whole tubercle is converted into pus. The tuberculous matter being thus liquified, ulceration of the surrounding tissues takes place, and the pus escapes as from an abscess.

The duration of the different stages of granular tubercle, it has been stated, is very various. It seems probable, from the short interval which elapses in some cases from the perfect health of the patient till his death from phthisis, that the whole duration of the disease hardly exceeds a month. In other cases, however, it is probable that each stage may last many weeks, or months, or years. Indeed, some patients appear to be dying of phthisis during a long life. As the granulations are frequently met with in every stage in the same lung, it is probable that the tubercular matter is often deposited in a succession of crops. Such are the laws of granular tubercle, as established by Cruikshanks. It must be admitted, however, that these laws, though generally are not universally received; for many pathologists, with Andral at their head, conceive that tubercle is always deposited in a crude state, and consequently that the grey gelatiniform matter and tubercle are distinct diseases. They admit that tubercular matter is often found within the gelatiniform matter, but esteem this an accident, the latter disease having supervened on the former. They admit also the central suppuration of the tubercle, but consider it to be caused by its including a portion of living cellular tissue, which takes on a suppurative action. Another circumstance, also, which has divided pathologists, is, whether tubercle is the result of inflammatory action. It is certain, however, that the tissues immediately surrounding both the granular and crude tubercle are often perfectly healthy in appearance, and that no redness or other vestige of disease is visible. It follows, therefore, if tubercle be a result of inflammation, it must be strictly of an achromatous character.

When tubercular matter is deposited in large round masses, it follows the same laws and course as granular tubercle. When, however, it is *infiltrated* into the substance of the lung, its changes are similar, but not so definite; for although the conversion of the gelatiniform mass into crude tubercle, and of crude tubercle into pus, begin in the interior of the infiltrated mass, yet these processes may be more or less superficial, and originate at any given point. Also, when deposited at the free surface of a serous membrane, it is generally found in a crude state, and so loosely attached that it may readily be wiped off; and whether it undergoes in this state any further conversion is undetermined. It is apprehended, however, that the vital changes which have been demonstrated taking place in the granular and larger formed masses distinctly prove this substance to be a living part, and subject to the laws of life. Some authorities have endeavoured to account for these changes by supposing some loose cellular tissue has become incorporated in the tubercular matter, and given rise to the changes in question; but this hypothesis hardly alters the case, as it still shows a living principle essentially connected with the tubercle. We shall now proceed to offer a few short remarks on the seat, size, and forms of tubercle.

When tubercular matter is deposited in definite masses, their *form* is round or ovoid; and as these forms are constant, it is evident this characteristic of their nature is not accidental, and almost demonstrates that it is first deposited in a fluid state.

The *size* of the tubercle is very various, or from a small granule to a hen's egg. In general, however, they vary in magnitude according to the organs in which they are situated. In the lungs they are seldom bigger than a swan-shot, although they have been met with as big as a pea, or even a hen's egg. In the spleen, they vary from a small shot to a large bean; while in the liver they are seldom less than an olive, and often as big as an orange. It is in the cervical, axillary, and inguinal regions, and also in the folds of the mesentery and mediastinum, that, according to Lugol, they attain their largest size, being often in these parts as large as an apricot, and sometimes greatly exceeding a large egg. These large tubercular masses, Lugol conceives, are often constituted of two or more tubercular tumors united; a formation sometimes rendered evident by incising the tumors, when we find the divisions distinctly marked.

Most pathologists conceive that the round tubercle is, for the most part, non-encysted—so much so that Louis states that he has only met with one case of encysted tubercle; but Lugol affirms that they are generally covered with an envelope.

The *seat* of tubercle is perhaps every tissue of the body; but, as a general rule, it has a decided predilection for cellular tissue. Dr. Carswell is of opinion, when the mucous system constitutes a part of the organ affected, that system is its principal seat.

The deposition of tubercular matter appears to be the result of a constitutional taint; for when a limb has been amputated in consequence of a scrofulous joint, the disease has, in general, broken out in some other joint or part. Again, notwithstanding the many phthisical bodies that are examined, and the many accidents incident to the examination, no instance is known of tuberculoma having been contagious. Tubercular matter likewise is not deposited with an equal frequency in all organs; neither are those organs which are the most frequent seat of tuberculoma in the child those organs in which it is most frequently found in the adult. Thus, out of 100 cases of tuberculated children, and 100 tuberculated cases of adults, M. Lombard found tubercles—

	Children.	Adults.
In the Lungs	73 times	100 times
Bronchial ganglia . .	37	9
Mesenteric ganglia . .	31	19
Spleen	25	6
Kidneys	11	0
Intestines. . . .	9	26
Nervous centres . . .	9	4
Cervical ganglia . . .	7	7

	Children.	Adults.
In the Meninges of the brain	6	2
Pancreas	5	0
Gastro-hepatic ganglia	5	0
Sub-peritoneal tissue	5	4
Inguinal glands	3	0
Sub-pleural cellular tissue	2	0
Lumbar ganglia	1	4
Sub-mucous tissue of urinary bladder	1	1
Epiploon	1	1
Walls of the gall-bladder	1	1
False membrane of the pleura	1	2
Axillary ganglia	0	3
Ganglia of the anterior mediastinum	0	3
False membrane of the peritoneum	0	2
Intercostal muscles	0	2
Ovaries	0	2
Liver	0	1
Cavity of the pleura	0	1
Anterior mediastinum	0	1
Vertebræ	0	1
Ribs	0	1
Uterus	0	1
Prostate	0	1

Thus, it will be seen that tubercles of the spleen occurred in $\frac{1}{4}$th of the cases of children, and only in about $\frac{1}{16}$th in the adult. Again, tubercles of the intestines were found in only $\frac{1}{11}$th of the children, while in the adult they were met with in every fourth case. On the contrary, tubercle of the bronchial glands is much more common in the child than in the adult, or in the ratio of 4 to 1. It will be seen also that tubercles of the brain and meninges are more frequent in the child than in the adult, nearly in the ratio of 3 to 1. Tubercles of the lungs, it is admitted, are more frequent in the adult than in the child. Indeed the lungs are so constantly the great primary seat of tubercles, that Louis, after examining upwards of 350 adults that had fallen from phthisis, affirms it to be a *law* to which there are few exceptions, "that in the adult tubercles are never found in other parts of the body without the lung be also similarly affected." In the child, however, the exceptions to this law, according to Lombard, amount to one-third of the whole number of cases. Having thus stated the general laws of tubercle, it now remains to point out particular instances of this disease in the different organs and tissues.

Tubercles of the *brain* are often met with in children, and especially in those of a strumous constitution, between the ages of 1 and 12 years; after which they are rarely met with till after 20. In the child, the tubercular masses are most common in the hemispheres of the brain, and occupy indifferently the cortical and medullary substance, sometimes invading both. The cerebellum is also not unfrequently the seat of tubercle in children.

In the adult, tubercles of the brain are much less common than in children, and the parts situated above the centrum ovale are their most frequent seat. After those, the cerebellum, the meso-cephalon, the medulla oblongata, the spinal cord, the crura cerebri and cerebelli, the thalami opticorum, the corpora striata, the pituitary gland, and the commissura of the thalami,—instancing an order of liability to tubercle, says Andral, which by no means corresponds with that of inflammation or of ramollissement.

The tubercles found in the substance of the brain are generally few in *number.* In many instances we find but one; in others, two; and in no instance are they numerous. In *form,* they are generally globular; but although globular, occasionally their surface is unequal. In *size,* they vary from a small shot to a pullet's egg, and they have been met with still larger; the whole extent of one hemisphere of the brain or of the cerebellum having been either converted into a tubercular mass, or obliterated by its pressure.

Tubercles of the brain are often encysted. Gendrin affirms they are always so, and Léveillé is of the same opinion: the cyst is sometimes thin and adheres externally to the brain, while sometimes its internal surface sends processes into the heart of the tubercle. In other cases the membrane is of a remarkable thickness, fibrous, and even cartilaginous. The portion of the brain which surrounds the tubercle is often perfectly healthy; at other times it is congested, and at others in an almost diffluent state.

It is generally supposed that tubercles are first deposited in the brain in a fluid state, and that the aqueous portions are afterwards absorbed. After an uncertain time they undergo the process of softening, and pus is found at their centres. In a more advanced stage, the greater portion of the tubercles having been converted into pus, they have been mistaken for abscesses.

The spinal *cord* is also occasionally the seat of tubercles. A very beautiful specimen of this disease, situated in the lumbar portion, is to be found in the museum of St. Thomas's Hospital.

Besides the substance of the brain and cord being the seat of tubercles, their membranes are liable to this affection. Andral gives a case in which the anterior fifth of the pia mater covering the right hemisphere was studded with a great number of tubercles. Gendrin also gives another in which a softened tubercle was found between the dura mater and the arachnoid; and similar instances have been seen of tubercle existing between the rachidian dura mater and arachnoid, and also external to the rachidian dura mater.

OF TUBERCULOMA OF THE LUNGS, OR PHTHISIS.

The deposition of tubercular matter in the *lungs* is termed *phthisis.* In the lungs the tubercular matter is secreted either as granules, or in larger masses, or it may be infiltrated into the substance of the lungs. We find it also in the grey semi-transparent state, converted into crude tubercle, and also transformed into pus. Each of these states may exist, *per se,* in the lung, but more commonly all these different states exist in the same lung and at the same time.

When death arises from the presence of the grey semi-transparent tubercle, the lung, on being torn, presents a granular surface, caused by the presence of myriads of miliary granulations, rather smaller but most resembling, except as to colour, the granules of boiled sago; while in other parts the tubercular matter is more fluid, less formed, and consequently infiltrated; and here and there may be met with granules undergoing the conversion into crude tubercle.

The patient more often falls in the second stage, or after the grey tubercular matter, or a considerable portion of it, has been converted into crude tubercle. In this stage the granular form has disappeared, so that the lung, at its most diseased portion, appears infiltrated with crude tubercular matter. It is in this stage also that we sometimes find the tubercle deposited in large circumscribed round masses as big as a nut, a walnut, or an egg.

When the patient falls in the last stage, or after the tubercular matter has ripened, softened, and been converted into pus, we find, if the lung contains the large crude round tubercle, that this process has begun in the centre, and proceeds from that point to the circumference. But when the matter has been infiltrated, as it more commonly is, this softening appears to commence at some internal but undefined portion of the diseased part, which proceeds till at length an abscess forms, which, for the most part, ruptures into one or more bronchi, and the pus is now thrown up by coughing.

In whatever stage the patient may fall, the deposition of tubercular matter does not take place with equal frequency in all parts of the lungs, but is principally limited to the anterior and superior lobes, only rarely affecting the inferior or posterior lobes.

In general both the superior lobes are affected, since Louis, out of 100 cases, only met with five instances in which it was limited to the left lung, and only two in which it was limited to the right lung. Posthumous examination also seems to show that the tubercular matter is deposited in crops in the superior lobes, and generally in three crops; that at the root of the lung, and immediately under the clavicle, being riper and more advanced; that in the middle portion in the crude state; and that towards its summit in the grey or granular state; showing, if the tubercular matter follows a similar course in different parts of the lung, that it must have been deposited at different times. Louis found only two exceptions to the law of the greater tendency to ripen under the clavicle.

When the tubercular mass is completely softened and converted into pus, the abscess formed is termed by the old masters, vomica; and by Laënnec, "*caverne*." The dimensions of the vomica are very various, sometimes not so large as a pea, while others occupy nearly the whole lobe. There may be only one vomica, but more commonly there are two or more; and, when multiplex, they may be isolated, or else communicate by fistulous openings. Sometimes they are deeply seated in the centre of the greatest thickness of the lung, while in other instances they are so superficial that the only remaining wall is the pleura, and this occasionally ruptures, causing pneumo-thorax, followed by pleurisy. In most cases, however, the abscess ruptures into one or more bronchial tubes.

The interior of the vomica is occasionally uniform and circular, but more commonly it is irregular and broken, and coated by a thin muciform matter rarely susceptible of organization. Besides being irregular, the cavity of the vomica is often traversed by portions of condensed pulmonary tissue infiltrated with tubercular matter. In very rare instances, says Laënnec, I have found *blood-vessels* in these "*brides*," or columns, but more commonly, if not constantly, they are *obliterated*. Indeed, it appears to be a law to which there are few exceptions, that the deposition of tubercular matter is so effected as to turn aside the blood-vessels without the walls of the vomica, and, by pressure, to flatten and obliterate them. It is extremely rare, consequently, for a vessel to be met with either in the abscess or in the tubercular mass; so that, if the lung be injected, the colouring matter seldom reaches the cavity. M. Guillot, however, by a series of minute injections, dissections, and microscopic observations, has further investigated the condition of the immediate walls of the abscess, and asserts that although no large blood-vessel is to be found within a considerable distance of the vomica, yet, after a time, a series of most minute vessels hardly a millimetre in diameter creep over the interspace between the periphery of the tubercle and the pulmonary artery, and communicate either with the bronchial arteries, or with the arteries of the thoracic walls, by many of the adhesions or false membranes. The congeries of these vessels under the microscope present an appearance of velvet; and in this manner, says M. Guillot, the blood is once more brought in contact with the atmospheric air, and returned to the heart by the pulmonary and bronchial veins, and by the vena azygos. If this statement be confirmed, it results, that the greater the extent of tuberculoma of the lungs the greater is the capacity of the capillary vessels for arterial blood, and may account in some measure for the florid appearance so often met with in the phthisical patient.

On the contrary, the tubercular matter is generally deposited *around* and in the bronchial tubes, and by its pressure quickly obliterates them; so that we never find bronchial tubes passing through a cavity, but always find them, as it were, closely cut off at its walls. This obliteration may constantly be shown, as it is rare to find a cavity, however small, into which one or more of the bronchial tubes do not open.

The walls of the vomica are formed sometimes by healthy condensed pulmonary tissue; at others by pulmonary tissue infiltrated with tubercular matter in some or all of its different stages; and occasionally by pulmonary tissue in a state of inflammation, or, according to Louis, in one case in 18. The matter contained in the vomica is often a white or yellowish pus, intermixed with portions of broken-down tubercular matter; but, in general, it may be said to vary from a bloody sanies to a laudable pus.

The ancients thought that vomicæ were capable of healing, if not of cicatrizing, and Laënnec conceives that his researches have proved this to be the fact. The process nature adopts to attain this end he conceives to be as follows: instead of the muciform matters which usually line the vomicæ, a distinct membrane is formed and organized, and which, instead of secreting pus, secretes a serous fluid. This membrane gradually becomes cartilaginous, and forms a cyst lined with a mucous membrane. The cyst thus formed may either communicate with the bronchi, or it may be closed and filled with a cretaceous or other matter. The objection to phthisis being cured in this manner, is, that many pathologists with extensive opportunities have never seen such a cyst. Another mode in which the abscess is supposed to heal, is by granulations after the manner of ordinary abscesses, and that its site is marked by a linear cicatrix of condensed cellular tissue. It is certain that these cicatrices are often met with when the lung is otherwise healthy; and one or more bronchi may sometimes be found terminating in them as in a cul-de-sac; but that they denote the healing of a vomica and not the healing of an ordinary abscess, or a ruptured air-cell, is by no means established. The possibility of a tubercular abscess healing and cicatrizing may perhaps be established; but it must be admitted to be a circumstance of most rare occurence, and a singular exception to the general law of phthisis, being almost invariably fatal.

In examining the bodies of those that have died of phthisis, we find the lungs are not the only organs that have suffered in the general destruction that disease has inflicted on the human frame; for we discover a vast extent of disease either directly or indirectly set up in other organs of the body. Louis has, with great labour, noted the different concomitant affections which he observed in 102 persons dead of phthisis; and though they differ in some of the numerical statements from what has been observed in this country, they are perhaps the nearest approximation to the truth we possess.

Out of 102 phthisical patients, Louis found—

The epiglottis ulcerated mostly posteriorly in	18
Larynx ulcerated	23
Trachea ulcerated mostly posteriorly.	31
Acute final pneumonia	$\frac{1}{10}$

The bronchi were widened, thickened, or reddened, or presented small ulcers very frequently when leading from excavations. Louis also conceives bronchitis to be always produced when pulmonary tubercles soften. Pleuritic affections were nearly as constant as the bronchial affection, and he finds an uniform proportion between these two affections and tubercular disease.

Complications affecting the Alimentary Canal.

Of 96 phthisical stomachs $\frac{1}{5}$th only were healthy.

They were softened, thinned, reddened, thickened, or contracted in $\frac{3}{4}$ths of the cases; ulcerated in 2 cases.

The duodenum was ulcerated in 3 cases; follicles enlarged in some instances.

In the small intestines the patches of aggregate glands were ulcerated in $\frac{5}{6}$ths; while the mucous membrane was sometimes reddened, and but rarely softened and thickened.

In the large intestines ulceration a little less frequent, but more extensive than in the small.

Softening of mucous membrane in $\frac{3}{4}$ths of the cases of large intestines.

The mesenteric glands tuberculous in $\frac{1}{4}$th, mostly toward the cœcum.

The peritoneum in 4 cases recently inflamed.
1 case semi-transparent miliary tubercles.

The peritoneum, the mesentery, and omentum were thickened and tuberculous, and the seat of effusion in $\frac{1}{4}$th of the cases.

Of the Accessary Organs.

The liver was fatty in $\frac{1}{3}$rd of the cases.
The heart was generally reduced in size.
Pia mater infiltrated with serum in $\frac{3}{4}$ths.
Brain universally or partially softened in $\frac{1}{10}$th.

Of the preceding complications Louis considers all tuberculous deposits, ulcerated air-tubes and bowels, and fatty liver as proper to phthisis.

Such are the principal lesions found in phthisis.

Besides tuberculoma occurring in the substance of the lungs, the *pleura pulmonalis* and *costalis* may also be the seat of tubercular deposit. In the museum of St. Thomas's Hospital is a specimen in which a considerable number of tubercles, about the size of a bean, are situated immediately under the *pleura pulmonalis*, and having scarcely any connexion with the lung. When deposited in the sub-costal pleural tissue in the form of tumors, they vary in size from a millet-seed to a large pea. When miliary, these tubercles are often exceedingly numerous, amounting to many hundreds, and are generally found in a crude state; but instances have been met with of both the other stages. In other instances the tubercular matter is infiltrated into the substance of the pleura, and sometimes exuded at its free surface.

Laënnec has only met with three or four instances of tubercles deposited in the walls of the *heart;* and Dr. Baillie mentions only three cases in which there were tumors of this kind, each about the size of a walnut. Tubercle in the walls of the left ventricle occurred some years ago in St. Thomas's Hospital, in a man whose heart was greatly enlarged; it was about the size of a large bean, and softened. Tubercle of the heart is unquestionably a rare form of this disease.

OF TUBERCULOMA OF THE ALIMENTARY CANAL AND OF ITS AUXILIARY VISCERA.

Tubercles have been met with in the tonsils; and Dr. Baillie states that he once met with a scrofulous swelling at the lower end of the *pharynx* and beginning of the œsophagus. It formed on that side of the pharynx which is next the larynx; and from this circumstance the patient had not only lost the power of swallowing, but was unable to speak except in the lowest whisper.

Tubercles are so rare in the stomach that Andral, notwithstanding his extensive pathological researches, only met with them twice or thrice. They are more common in the small intestines, especially towards its lower portion, and are again rare in the large intestines. They have three seats, or the sub-mucous cellular tissue, the interstices of the muscular fibres, and the sub-peritoneal tissue. In size they vary from a millet-seed to a pea, while, as to numbers, sometimes there is only one or two found throughout the whole intestine; but in other instances they are numerous. The mucous membrane around them may be healthy, simply injected, or ulcerated.

The *Spleen* is rarely seen affected with tubercles in the adult, and not commonly so in children. But in either case it is rare to meet with them in the spleen unless tubercles exist also at the same time in the lungs.

The *Liver* is more commonly the seat of tubercles than the spleen. They are sometimes extremely superficial, being seated immediately under the peritoneal covering, and in this case they are generally extremely numerous and small. In other instances they are deep-seated and large, varying from the size of a nut to an egg. There may be several, but their number is in general in the inverse ratio of their size, so that when large there is only one. They are commonly found in the crude state, and only rarely softened at their centre. Many pathologists have affirmed that they are never found in the grey semi-transparent or first stage in the liver, and the fact is certainly extremely doubtful; but in a case that died some years ago at St. Thomas's, a cyst was found containing a fluid which, from its grey gelatiniform character, appeared to be tubercular matter in its earliest state, and a similar instance or two may be found in other writers. The substance of the liver around these tumors is often healthy. Tubercles have also occasionally been found in the walls of the gall-bladder, and M. Lugol once found one as large as a walnut in the cystic duct.

Tubercles have occasionally been found in the *pancreas*, and Lobstein speaks of having met with five instances of them in this viscus in children. But still they are rare, for Lugol never met with an instance, and few authors have made any mention of them as incident to this organ.

In the *Kidneys* tubercles are common, and they may invade either the cortical, medullary, or the tubular structure. There are seldom more than five or six, and these vary in size from a pea to a nut, but they have been seen as large as a walnut. They have hitherto been found only in the crude or else in the softened state: when softened they often cause large and destructive abscesses of the kidney, with great thickening and enlargement of the ureters. Tubercular matter has also been found between the coats of the ureter, or secreted at its surface.

The *peritoneum* is also frequently the seat of tubercular deposit, both in the child and in the adult, and is one of the *tabes mesenterica* of pathologists. Its seat is the sub-cellular tissue, not only of the portion covering the walls of the abdomen, but also of that covering the intestines. In size the tubercle is not bigger than a millet-seed, but they are numberless; in general some slight inflammation of the peritoneum, attended with effusion of serum, usually accompanies it. When the peritoneum likewise is the seat of adhesion, or is covered by a false membrane, tubercular matter is very constantly deposited in the connecting cellular tissue in the substance and at the surface of the false membrane.

OF TUBERCULOMA OF THE GLANDS.

In the *cervical* glands tubercles have long been designated by the name of Scrofula or *King's evil.* Indeed, the scrofula of the older pathologists for the most part was limited to tubercular affections of the glands. This disease may take place in infancy and in very early life, but it is much more common towards the end of the first or of the second septenary period, and indeed is met with at every period before 30. The tumors they form may exist on one or both sides of the neck; but, when double, they seldom attain the same excessive magnitude on both sides. Their volume is very various, sometimes hardly exceeding a plover's or a pullet's egg; but in other instances they acquire a size which may be termed monstrous, extending in bunches from the mastoid process to the middle of the lower jaw, to the clavicle, and even below it; and this formidable mass is sometimes increased by meeting with a continuous chain of enlarged axillary glands, and even with tubercles lodged in the mediastinum. When the disease is thus extensive the patient often dies from pressure on the larynx and trachea. On examining these vast tumors we generally find them to consist of a number of enlarged glands loaded with, or entirely converted into, tubercular matter, a few of them being softened in the centre. This mass of disease is usually surrounded by cellular tissue, more or less in a state of suppuration. The axillary glands are subject to a similar enlargement of firm tubercular deposits.

The *mesenteric glands* are often the seat of tubercles; and this is another of the forms of "tabes mesenterica." Many pathologists, however, and among them Lugol, consider the loose cellular tissue of the mesentery, and not the mesenteric glands, to be the seat of the tubercular deposit. Bœker has often injected, he says, the lymphatics with mercury in this disease, and has always found the injections pass freely through the glands; whence he concludes its seat to be the cellular tissue, and more especially that immediately surrounding the gland. It is probable, however, that both views are correct; and the latter accounts for the very considerable *embonpoint* which is sometimes seen in these cases. Still, in whatever tissue developed, the tubercular masses are often numerous and generally large, varying from a nut to an orange. Indeed, in no other region, says Lugol, do we find the masses of such a magnitude. These tubercles are often seen softened in the centre and very constantly contain calcareous matters, and are moreover often partially converted into bone. They seldom cause ulceration of any part of the intestine except the cœcum, with which, from its being bound down, they occasionally contract adhesion, and thus it becomes involved in the disease. In the great majority of these cases the body is singularly emaciated.

The *inguinal* glands are also in a few instances the seat of tubercles, and by their enlargement often make pressure on the nerves and blood-vessels about the abdominal ring, rendering this disease, generally void of pain in other parts, one of great suffering. The disease at length spreads to the deeper-seated glands, and the patient dies exhausted either by long-continued suppuration, or else from inflammation excited in the peritoneum.

The *bronchial* glands are perhaps in children as frequently the seat of tubercle as the cervical or the mesenteric. Those situated at the lower extremity of the trachea are most frequently affected, and sometimes they attain a large size and contract adhesion to the lungs. Under these circumstances they occasionally soften, suppurate, and ulcerate into the bronchi or pulmonary tissue, and the patient throws up pus as from a vomica or pulmonary abscess.

Tubercular tumors are also found in the *ovaries;* and Lugol mentions a case in which this took place in a young girl in whom these morbid productions likewise existed in the folds of the mesentery, in the cerebellum, and in the lungs. Tubercle has also been occasionally seen in the *uterus*, in the *testicles*, in the *vesiculæ seminales*, and in the *prostate*, and also in the coats of the *bladder.*

OF TUBERCULOMA OF THE SUBCUTANEOUS CELLULAR TISSUE.

M. Lugol has seen two cases of tuberculoma in the cellular tissue immediately exterior to the bone. In one a tuberculous tumor successively destroyed the zygomatic process, a portion of the sphenoid, and also of the petrous portion of the temporal bone, so that it lay in contact with the dura mater. In the other case, a subcutaneous tubercular tumor gradually perforated the sternum, and thus arrived at the anterior mediastinum. Tubercles are also formed in the subcutaneous tissues of the face, forming "*acné.*" They also sometimes form underneath the skin of the arms or thighs, or in the posterior region of the neck. The most general instance, however, of subcutaneous tubercle is in *Elephantiasis*, when the face, arms, hands, legs, and indeed almost every part of the superficies of the body is the seat of an endless succession of tubercles, forming, ripening, suppurating, ulcerating, and healing; thus keeping up a ceaseless irritation, destroying the health of the patient, and producing a singular, thickened state of cutis and cellular tissue, the former becoming a dark brown *intermingled* with numberless white cicatrices.

Of Tuberculoma of the Bones, Muscles, and Blood-Vessels.

Tubercles are occasionally formed in the very centre of the long bones, as the tibia, humerus, or femur, and the tumor is frequently surrounded on every side with healthy osseous tissue. More commonly, however, the tubercular matter is infiltrated generally into the cancellous structure of the small bones, as into the tarsal and metatarsal bones, the carpal and metacarpal bones into the heads of the long bones, the petrous portion of the temporal bone, and into the cancellous structure of the vertebræ. In these cases the osseous substance becomes so softened, so entirely deprived of osseous matter, as to be readily cut with a knife; or else so broken down by the superincumbent weight of the body, that the limb becomes shortened, as in hip disease; or else the person becomes permanently deformed, as in the hunch-backed.

Tubercles may be generated in the muscular tissue, and Lugol has met with them embedded in the psoas muscles, and entirely isolated from every other structure.

Symptoms.—As a general principle it may be affirmed that tubercular matter, being first deposited in a soft if not fluid state, and by an action either entirely void of all inflammation, or else of an achromatous character, is unattended with pain, and therefore gives little note of its early existence, except by some slightly impaired function of the organ or part diseased. Again, when the tubercle undergoes its transformation into the hard yellow opaque substance or crude tubercle, this change is often so gradual that the parts accustomed to its presence may even now be only slighty irritated. It seems an established law, however, that when the tubercle is about to soften, that the constitution not only takes the alarm, but great local and general irritation is now set up, and the patient's life, if the part be vital, rapidly verges towards a close. As the course of the disease is extremely short in some cases and extremely long in others, it may be *acute* or *chronic.*

Symptoms of Tuberculoma of the Brain and Spinal Cord.—Dr. Hennis Green has given an analysis of the symptoms observed in 30 children that died in the hospitals of Paris of tuberculoma of the brain. Thus in four cases no cerebral symptoms existed; in two it was only marked by periodic headache; and in two by deafness and purulent discharge from the ears. In nine cases the symptoms were those of acute hydrocephalus,—as headache, vomiting, amaurosis and convulsions; a few with symptoms of softening; while the rest died of consumption and of small-pox. The duration of these symptoms was very various, or from one month to three years. Other observers have mentioned great fretfulness of temper, contraction of the limbs, with a frightful degree of emaciation.

In the adult the formation of tubercle of the brain is often equally latent. In other cases, however, intense and continued frontal headache, tearing from the patient the frightful hydrocephalic cry, vomiting, impaired intellect and impaired motion, with perhaps occasional attacks of epilepsy, are its effects. Still these symptoms only denote an injured state of the brain, without indicating the particular cause, the same symptoms accompanying many other tumors and diseases of this organ. It seems, however, to be a received opinion that tuberculoma of the brain is seldom or never met with after the age of 45. The duration of this affection is often long, but the acute symptoms rarely last more than a week to a fortnight.

Tubercles of the cerebellum are still more rare than of the brain, and Andral has deduced from 20 recorded cases the following as their symptoms,—headache in 17; continued fainting and vertigo in 1; the sight weakened or lost in 7; the intellect impaired in 5; convulsions in 7; palsy in 8; vomiting in 10, while the genital organs were only abnormally excited in one.

The following case, given by Bayle, of tubercle in the medulla oblongata, shows the latency of the disease as well as also the occasional symptoms to which it gives rise. A man, aged 24, had laboured for some time under the ordinary symptoms of phthisis. Three days, however, before his death, he was seized with incessant twitchings of the tendons of his right hand, while his urine and fæces were passed involuntarily. Twelve hours before his death his fingers were bent on the palm, the hand on the fore arm, and the fore arm on the upper arm, and this affection was more marked on the right than on the left side; his face was also convulsively twitched. A tubercle about the size of a nut was found a little above the corpora pyramidalia and olivaria.

The symptoms of formation of tubercle of the cord are equally uncertain. In some cases the patient suffers atrocious pains in the back, while in others little or no pain is felt, but all below is benumbed or palsied. The following sketch of this disease in a man aged 54, and given by Gendrin, is perhaps a fair generalization of the symptoms. The first symptom was numbness of the lower extremities, followed by a total loss of sensation, with twitchings of the limbs, but the patient was still able to walk with a stick. This power quickly ceased, and he was confined to his bed, and ultimately died from obstinate constipation, retention of urine, and gangrene of the back. In another case, in which an encysted tubercle was found softened at its centre between the fifth and seventh cervical vertebræ, the symptom was epilepsy.

Symptoms of Tuberculoma of the Lungs, or of Phthisis.—As a general law, it may be stated that the presence of tubercular matter in the substance of the lungs, whether in its semi-transparent, crude, or softened state, does not cause the slightest pain to the patient; and when pain does exist in the chest or between the shoulders, it proceeds entirely from the effects of violent coughing, or else from inflammation, of no very active character, of the pleura.

The greater number of cases of phthisis commence, then, with some slight cough, the sputa being hardly discoloured, or only slightly stained by a trace of pus or blood. The patient also is feeble, easily fatigued, has burning heat of the soles of the feet at night, and some perspiration in the morning; he is also irritable, his appetite capricious, and he is convinced of a sensible loss of flesh. At this period the sounds of the chest on percussion are healthy and perfectly sonorous under both clavicles, but the respiration is affected, being louder or more puerile in both lungs; or else it is feeble in one lung, and louder in the other, while the times of expiration are prolonged. These symptoms are accompanied by a permanently accelerated pulse, from 80 to 90, while a more fatal sign is present, or that of the heart being heard beating all over the chest, showing that the lungs are condensed, and thus rendered a better conductor of sound. This stage or state of things may last a few weeks or a few months; and even the patient often revives, and seems to an unpractised eye, for a short time, to have recovered his good general health.

The disease, however, silently proceeds, and all the preceding symptoms are gradually but sensibly aggravated. The hectic becomes permanently established, and the sweat from the head and chest towards morning is often so profuse that the patient lies deluged, and is obliged to change his linen; the cough is more distressing, the sputa purulent, the hæmorrhage more constant, and the pulse more frequent, or from 90 to 110. He now often vomits after each meal, and the emaciation consequently is well marked and decided. On percussion, also, a dull sound is now returned from under the clavicles; on auscultation we hear bronchophony: the heart's action is still more palpable over the chest; the respiration is accompanied by some mucous râle; while the times of expiration are still further prolonged. The duration of this stage is very indefinite, or a few weeks to many months, and during its progress the disease occasionally intermits and becomes latent, so that there is for a time often a marked amendment, and the patient regains some strength.

The third and last stage of this eventful disorder is that in which the tubercle softens and an abscess forms. In this stage all the preceding symptoms attain their highest degree of intensity; the hectic is now often followed by a cold clammy sweat; the appetite is lost; a colliquative diarrhœa often supervenes; the sputa are often pure, as from an abscess, but at length become æruginous, or little more than a rusty sanguineous mucus; the pulse rapidly increases to 110 or 150; the emaciation is frightful; and nothing, indeed, appears to survive this general wreck but the mind, which is often firm, collected, and even hopeful to the last. In this stage the phenomenon on percussion has undergone another alteration; the dull sound returned in the second stage now giving place to an unnaturally clear sound, in consequence of the introduction of air into the cavity of the lung; and, according to the condition of the abscess, we have now the râle amphorique, or the tintement metallique; while the mucous râle is for the most part tracheal. It is remarkable, however, that as soon as the abscess bursts the cough is often greatly relieved. The duration of this stage is generally shorter than the former, but still, notwithstanding the existence of one or more abscesses, it often lasts many months. Such is a short outline of the course and phenomena of this destructive disease, which sometimes terminates life within a month, a few weeks, often in a few months, while it occasionally lasts many years. The following is a short analysis of the principal, local, constitutional, and stethescopic symptoms of this remarkable affection.

Affection of the *Bronchial Membrane* is certainly the most frequent concomitant symptom of phthisis, but the part of the bronchial membrane affected is not always the same; most commonly the mucous membrane of the smaller bronchial tubes is first affected; then that of the larger ones, the disease gradually ascending till it often ends in a chronic laryngitis, with a partial or total loss of voice. In a few cases, however, this order is inverted, and almost the first symptom is a laryngitis, with hoarseness and constriction of the throat; after which the disease descends to the larger and then to the smaller bronchi, when the patient begins to expectorate; his pulse becomes hurried; he loses flesh; and all the unerring symptoms of phthisis are established.

The *expectoration* which takes place in phthisis from the bronchial membrane is usually purulent, the pus thrown up in the early stages being for the most part of good quality, and formed into "sputa," sometimes sinking and sometimes swimming in water; and may be either of a sweet, insipid, or saltish taste. As the disease advances, it is often thrown up pure, as from an abscess, and without any separation into sputa, and is sometimes mixed with particles of a curdy substance.

In the last stages it is often of an æruginous green, a dirty sanies, or a rusty muciform serosity. The quantity expectorated varies greatly; sometimes only a few sputa, or not more than half an ounce in the 24 hours, and then perhaps more than a pint in the same period, so that in a few weeks the patient has often expectorated more than his own weight of pus. If a small abscess has burst into the bronchi, the sputa, though something increased in quantity, are hardly changed in character; but if the abscess be large, the quantity thrown up is proportionally great, and *en masse*.

In a very few instances the commencement of phthisis is marked by the expectoration of a cretaceous matter, or of small calculi, or of small portions of ossified cellular tissue. In some rare instances, also, the patient dies of *Phthisis sicca*, and without suffering from any expectoration whatever. If the bronchial membrane be examined after death it rarely presents any definite trace of inflammation; and Louis considers it to be in general healthy, except in those tubes which lead to the vomica or abscess. It appears, therefore, to be a strictly achromatous inflammation

Hæmorrhage may precede, or be contemporaneous with, or succeed to, the bronchial affection. If it precedes, the patient being, as he imagines, in excellent health, is suddenly seized with hæmoptysis, followed perhaps by cough. This attack subsides, but a second and a third follow, till phthisis is established. Hæmoptysis more commonly, however, occurs later in the disease, increasing the debility, aggravating the symptoms, and hastening the fatal catastrophe. The quantity of blood lost is very various; sometimes only enough to streak the sputa, at others a few tea-spoonfuls, but in some instances is so profuse as to amount to one, two, or more pints. In the still more advanced stages, though cases occur in which the quantity of blood thrown up is very great, yet more usually it is trifling, and more resembles a bloody sanies than pure blood; indeed, from the generally small quantities of blood thrown up in phthisis, it is almost an axiom in medicine that trifling hæmorrhages are more dangerous than large ones. The blood thrown up may be florid or dark coloured; in either case it probably escapes from the same vessels, the colour varying according to laws not yet determined.

The *cough* is as variable as the other symptoms. In some few cases the patient dies from tubercles in the lungs, and yet no cough is present. More commonly, however, the cough is troublesome, and often intense, so that every change of position, even turning in bed, the act of speaking, of eating, or of drinking, gives rise to it. Often it returns in fits or paroxysms, occurring at uncertain periods. It is singular that, as the disease advances and large abscesses open, that the cough, which was at first frequent and troublesome, often becomes comparatively tranquil, or is only excited to expel the purulent matter collected in the bronchi. A tickling cough usually denotes some affection of the glottis and larynx, parts which are more irritable and more abundantly supplied with nerves than the trachea or bronchi.

The *dyspnœa* is generally great in phthisis, the patient being unable to make any active exertion, or even to read a few lines without pausing. The dyspnœa, however, is not always proportioned to the amount of mischief; for there are instances in which the respiration has been performed with facility, even when two-thirds of the lungs have been in a state of tuberculoma. It is doubtful whether adhesions, unless very extensive, greatly affect the respiration. Should effusion of serum, however, or of pus from the bursting of an abscess, have taken place into the cavity of the chest, then the respiration is greatly impaired. The most common situation of the fistulous opening, caused by the bursting of an abscess into the chest, is the summit of the lung, or a little below the clavicle. It is usually very small, hidden by the lung, or so surrounded by adhesions that it is difficult to discover it. Again, when the abscess bursts not only into the chest but also into the bronchi, a "*triple opening*" is said to be established,and the disease is termed *pneumo-thorax*. When this latter event occurs, the life of the patient might be supposed to rapidly terminate, either by pleurisy or an entire exhaustion ; but it is singular the patient often survives this state many days, sometimes a few weeks, and Louis has given instances in which two or three months elapsed before the death of the patient.

The Stomach is supposed to be more or less diseased in three-fifths of the cases of phthisis ; yet it so seldom gives rise to any well-marked symptom that for the most part the affection may be said to be latent. In the worst cases the symptoms are only a capricious appetite, indigestion, some pain in the epigastrium, and vomiting after coughing.

The intestinal canal is at least as frequently affected as the stomach in phthisis ; but in general the abdomen is without pain, and, in the early stages of the disease, supple. The only marked circumstance connected with this viscus in this stage is, that the stools are more copious than in health, the body being unable to appropriate the accustomed quantity of nutriment prepared by the stomach. As the disease advances the patient often suffers from irritable bowels, or from diarrhœa alternating with constipation ; while, towards the close of the disease, the diarrhœa often becomes colliquative, hastening the fatal result. In some very few instances the peritoneum ruptures, and the patient dies of *peritonitis*, while in a somewhat larger number *Dropsy* takes place—Louis says in one case in four.

The Liver undergoes a fatty degeneration in about one-third of the cases, and so remarkable a lesion might be expected to give rise to some particular symptoms ; but this is not the case ; it may occasionally be felt somewhat enlarged, but neither pain, nor altered state of the secretions, or other circumstance, denote its diseased condition.

Of Hectic.—In some very few cases the patient passes through this disease without any attack of fever ; but in the large majority of persons no sooner is the "crude tubercle" established than the constitution suffers, and hectic of a marked character appears. The simplest form of this fever is a periodical return of a burning heat in the palms of the hands and soles of the feet. More commonly, however, the hectic fever is more complex, and the patient is seized with quotidian paroxysms of intermitting fever, so that many patients consider themselves to be labouring under that disease, the paroxysm consisting of shivering, fever, and profuse sweats. The time of the recurrence of the paroxysm varies, for it may come on in the morning or in the middle of the day, but is most common perhaps in the evening.

In many instances one or more of the stages of the paroxysm is wanting. Thus many patients suffer once in the twenty-four hours from coldness and shivering, without these being followed either by fever or sweating, and in like manner the paroxysm may consist solely of the hot or of the sweating stage. More commonly, perhaps, the paroxysm consists of two stages, as the cold stage and the sweating stage, or of the hot stage and of the sweating stage. The cold clammy perspirations which mark the former are the horror of every person labouring under this complaint. In the latter the attack generally takes place about five o'clock in the morning, when the patient awakes drenched in a perspiration so profuse that his body and bed-linen may be wrung. His head and chest are the parts from which it principally flows, and as the paroxysm subsides the urine often deposits a pink sediment. Louis found that in about one-fifth of his cases the attack of hectic was established before any abscess or cavity was formed in the lung, while in three-fifths it was deferred till after a cavity or vomica had formed, whence he concludes that the constitutional affection is not the result of the formation of pus, but is a law incident to tuberculoma generally.

The pulse is, in a very few instances, of its normal frequency throughout, or nearly so, the whole of the disease, but in 99 cases out of 100 it is small and acelerated in every stage ; or, while the disease is yet incipient, it ranges from 84 to 96 ; in a more advanced stage it varies from 110 to 120, and towards the close of the case it often exceeds 130, 140, or 150, so as hardly to be counted. In many instances the pulse continues stationary at about 96, till the hectic comes on, when it becomes rapid, but as the fever subsides it again returns to its usual beat.

The emaciation so remarkable in this disease is common to nearly all the tissues of the body, as the adipose tissue, the muscles, the bones, and even the intestines and skin are thinned. This emaciation often commences even before the disease can be said to be well established, so that the patient has often lost one or two stone before he applies for medical advice. In the more advanced stages the rate of emaciation is singular, the party losing perhaps three pounds in one week, and gaining two pounds and a half in the next, and this alternation of gain and loss goes on for many weeks, or months, always leaving a balance against the patient. Towards the close of life the loss greatly surpasses the gain, and occasionally amounts to four, five, six, and seven pounds in a week. The total loss the patient sustains is perhaps from one-third to half his whole weight.

The *mind*, though not capable of exertion, is perfect throughout the disease, or only wanders during the few last days of existence. It is seldom the patient dreads the future or despairs of the present, for nature, however threatening his symptoms, has imparted a singular buoyancy to his hopes, and he is always better; would be quite well but for his cough; feels able to take a long walk, and enjoys in expectation his meals; yet, with all this, he faints if he attempts to cross the room, and nauseates his food when brought to him.

Such are the general and local symptoms of phthisis, and which are sufficient indications that the lungs are diseased. The stethescope, however, adds many interesting additions, and enables us to determine not only that the lung is diseased, but the particular part of the lung which is diseased, and likewise the present state of the diseased part; and thus the discoveries of Laënnec and of Avenbrugger have rendered the diagnosis of Tuberculoma of these organs almost as perfect as though the disease was exposed to sight.

Physical Symptoms.—If we uncover the chest of a patient labouring under cough and other symptoms of incipient phthisis, we observe nothing remarkable, except as a general rule that its transverse diameters are small. If the disease be further advanced, we find the patient emaciated, together with a singular immobility or incapacity of dilatation of the portion of the chest immediately below the clavicle, so that he breathes chiefly by his shoulders and diaphragm, and is unable to "fill his chest." In the latter stages of the disease, the whole of the affected side of the chest, viewed anteriorly, is perfectly motionless; at a still more advanced stage, if an abscess has burst into the cavity of the pleura, and caused *pneumo-thorax*, the affected side is not only motionless but distended, and as it were bulging out. The examination of the bared chest, therefore, often affords valuable data for forming a diagnosis in phthisis.

If we apply the stethescope to the chest in incipient phthisis, the action of the lungs is perhaps little impaired, but we hear the heart beating all over the chest, and at a rate which varies in different subjects from 90 to 100. This symptom, if heard repeatedly, is always of anxious portent, for it denotes the density of the lungs to be increased, and thus rendered a better conductor of sound, and no cause is so constant of this change of density as tubercular infiltration. At this period air permeates the pulmonary tissue generally, so that percussion is still followed by a clear sound.

In the second stage, or that of crude tubercle, the density of the lung is still further increased, and the heart is consequently heard still more distinctly beating all over the chest. We have also the phenomenon of bronchophony. We hear the louder pulmonary *bruit* in the healthier lung, and a more feeble one in the most diseased lung, accompanied for the most part with bronchial or tracheal mucous rhoncus. On percussion, also, under the clavicles, the sound now returned is dull.

When the tubercular matter is softened and forms an abscess or vomica, we have, when the conditions are favourable, pectoriloquy, but much more commonly only bronchophony. If the conditions also be favourable, we can determine by the absence or presence of the *souffle voilé* whether the abscess be superficial or deep seated; also whether it be large, for in this case we have the *râle amphorique;* or on the patient coughing, a gurgling or splashing sound, or else the *tintement metallique.* We can determine also whether it has burst into the cavity of the chest, causing pneumo-thorax; by the affected side of the chest becoming enlarged and motionless; and by the remarkable circumstance of the "*tintement metallique.*" On percussion, also, under the clavicle, every part of the chest, even that which so lately returned a dull sound, now returns an unnaturally clear sound.

In the first stage of phthisis, says Andral, the blood offers no peculiarity, except that the clot is generally small and dense, containing a smaller proportion of red globules than usual, while the quantity of fibrine is normal.

In proportion, however, as the disease advances, and that the tubercles soften and caverns form, the clot still further diminishes, but is covered with a buff, which is thicker and firmer in proportion as the disease is more advanced. Two circumstances contribute to the production of the buff, or the increase of fibrine, so common in the last stages of phthisis, and again the continued diminution of the red globules. The buff in the last stages of phthisis is as common as in pneumonia, or in acute rheumatism.

These are the general local and physical symptoms of phthisis, a disease which can only be confounded with chronic bronchitis. The diagnosis, however, between the two diseases, is often extremely difficult, sometimes impossible, the patients equally labouring under cough, expectoration, emaciation, and hectic fever. The absence, however, of the dull sound on percussion, as well as of pectoriloquy, give a reasonable ground for believing that the disease may still be classed as bronchitis, and that the patient is not labouring under phthisis.

The *Prognosis* is universally fatal.

OF THE SYMPTOMS OF TUBERCULOMA OF THE ALIMENTARY CANAL, AND ITS ACCESSORY ORGANS.

No symptom is yet known by which tuberculoma of any portion of the alimentary canal can be determined during life; for the symptoms common to this disorder are common to many other alterations of structure, and even of function of these parts, and the only ground for inferring its existence is the fact of the patient labouring under phthisis. The leading symptoms are diarrhœa, and perhaps some slight peritoneal pain or irritation.

When tubercles form in the liver or spleen, those viscera are commonly greatly enlarged, but not the seat of pain or of much local inconvenience; the constitution, however, is at length affected, the peritoneum sympathizes, and dropsy follows. In the liver, when the tubercle is superficial and large, it may sometimes be felt through the abdominal walls during life. But the spleen being deeply seated, and the tubercle generally small, it may perhaps be inferred, but can seldom be discovered by the touch.

In the kidney, tubercles form in the same latent manner, and without pain. They also lead to dropsy; still the dropsy has no particular feature, so that until the kidney be examined after death, the real cause is seldom either inferred or discovered. In the event, however, of their determining an abscess of the kidney, the presence of pus in the urine, the lumbar pains, and the infrequency of abscess of that organ from any other cause, may lead us to infer the presence of a tubercle of the kidney.

The formation of tubercles of the peritoneum is perhaps equally latent, but from the irritable character of this tissue they shortly give rise both to local and constitutional symptoms. In general chronic peritonitis is set up, accompanied with much pain, increased on pressure, and by a small and extremely rapid pulse, and this is shortly followed by effusion into the cavity of the abdomen. Tuberculated peritoneum may be distinguished, however, from chronic peritonitis by the previous hectic state of the patient and his great emaciation, and by the existence generally of tubercles in some other organ or tissue of the body.

Tubercles of the *cervical glands* often acquire a great size without giving pain. At length, however, they become inconvenient from their great enlargement, so that sometimes the respiration is greatly impaired by their pressure on the trachea, and death has ensued, notwithstanding tracheotomy has been performed,—a result which, as the patient breathes freely, seems to demonstrate that the disease is not only local but constitutional. When the tubercular deposit is small, the glands and surrounding cellular tissue often suppurate, and a troublesome discharge ensues, but ultimately the patient recovers with his neck scarred. This is one of the few instances in which the patient survives this formidable disease.

When tubercules form in the *inguinal glands*, the disease is perhaps at first latent; but no sooner does it become active, and suppuration takes place, than the disease spreads inwards, the peritoneum becomes affected, and the patient, for the most part, ultimately falls from this formidable complaint.

The deposition of tubercular matter in the *mesenteric glands* is similarly latent; for whether the disease be acute or chronic, the patient suffers no pain. The chronic form is the most usual, and the early symptoms are—an inordinate appetite, with loss of flesh, while the stools are much more copious than in health. As the disease advances the pulse becomes rapid, the emaciation extreme, the appetite capricious, or altogether lost, and at last a colliquative diarrhœa closes the scene. In a few cases this form of tabes mesenterica is acute, and its course so rapid that the patient falls before emaciation can take place. A woman about thirty-five was admitted into St. Thomas's Hospital with diarrhœa, sickness, and a rapid pulse, but no pain was caused by pressure over the abdomen. She died within a week, when, on examining her, the mesentery was found to be the seat of many tubercles, as large as small walnuts, of which many were softened and purulent at their centres. She was a corpulent person, and had at least two inches of fat on the ribs. Lugol has seen many similar instances of embonpoint, and considers that the glandular structure is consequently not the seat of this affection.

When tubercle is deposited in the *bones* of the extremities the disease is at first equally latent, but as it advances the sufferings of the patient are great, the cartilages become affected, suppuration takes place, fistulous openings are formed, while from the softened state of the diseased bones the superincumbent weight of the body crushes them, and the limb is shortened. If the disease be situated in the vertebræ these bones are equally broken down, so that pressure is made on the spinal cord; the patient now suffers great pain down the back, and the power of locomotion is often greatly impaired. The displaced parts, however, at length become accustomed to their new condition, and the disease often terminates by anchylosis; and this having taken place, the patient, though deformed, recovers, and perhaps ultimately enjoys a considerable share of health. If the disease should take place in the long bones, as the head of the femur or its condyles, there is the same latency, followed by great suffering, which often destroys the patient before the disease has run its course and the tendency to health restored.

The many tubercular affections to which the cutaneous tissue is subject, cause but little constitutional affection, neither is the local inconvenience great; the patient, indeed, is annoyed by the unsightliness they occasion, but even in elephantiasis he often survives many years.

Treatment.—It appears, from the preceding statement, that tubercle has a natural tendency in some tissues, as the bones, the cervical glands, and the cutis, after destroying or impairing the part, to terminate in the patient's recovery. When, however, the tubercular deposit takes place in the brain, the lungs, the liver, the spleen, or other important organ, the patient is uniformly destroyed. The treatment, then, of tuberculoma resolves itself into what can be done in those cases in which there is a natural tendency to a return to health; and, on the contrary, in those cases in which the termination is inevitable death.

When the tubercle, then, is deposited in the bones, in the cervical glands, or other parts in which there is a natural tendency in the disease to subside, it is important, whether suppuration has or has not taken place, to support the strength of the patient by quina, sarsaparilla, the iodide of potassium, or other tonic, as also by wine and a generous diet, and the disease thus treated sometimes subsides before the patient's health becomes irretrievably lost. It is remarkable that all local treatment in these cases, as by poultices, ointments, or washes, is in general injurious. In the event, however, of this treatment failing, it may be a question, supposing a joint to be affected, whether the patient should not be advised to submit to the amputation of the limb.

In the treatment of the far larger class of tuberculoma of those organs in which the natural and inevitable tendency is towards death, it is to be regretted that its fatal course is little if in any degree retarded by medicine. We possess no cure at present for tubercle of the brain; and it is admitted, with hardly an exception, by the whole medical profession, that we possess no remedy for phthisis; and the same admission must be made as to the impossibility of our at present curing or even influencing the course of tubercle of the liver, spleen, or kidney, or of the mesenteric or cervical glands, or of tubercle infesting serous or mucous tissues. The cure of all these forms of tuberculoma will probably ultimately be found to yield to some specific medicine hereafter to be discovered; but till that happy event shall take place, the resources of art are limited entirely to palliatives; we shall limit the few remarks we have yet to make on this distressing subject to the treatment in phthisis.

Phthisis has been often treated on every general principle that could affect the part through the medium of the constitution: thus the patient has been bled, both generally and locally, and the blood drawn has been in every quantity; but as a general rule it may be affirmed, that in proportion to the quantity of blood taken, so has been the rapidity and the fatality of the disease: counter irritations, also, of every kind have been employed; and yet, as far as we can judge, without any favourable results. The patient has likewise been treated with every known purgative, either to regulate the bowels, or else with a view to a more active operation, and also with every known emetic, either with the intention of easing the cough, or else of producing vomiting, and yet the party has in no instance been ultimately benefited. In like manner, every tonic remedy has been tried; but the constitution has in no instance been so influenced as to lead us to imagine that the disease has been cured. The failure of every mode of *general treatment*, therefore, necessarily shows that the remedy, when discovered, must be of a specific character.

The number of substances which have been exhibited in the hope of finding this specific is quite remarkable; yet none of them has in any sensible degree affected either the symptoms, or the course of the disease, or visibly accelerated or retarded its so constantly fatal termination. Every metal of which half an ounce could be procured has been tried in some form or other, even to osmium, so difficult to procure, on account of its volatility, and yet without any sensibly good effect. One of the most remarkable results of these various trials is, that it has been found that minute doses of arsenic, exhibited for a few days, have improved the sputa, and appeared to benefit the patient, but if continued longer, the effect has been injurious; mercury is in every case injurious, and its use even predisposes to the disease. Every mineral acid has been tried, even to the fluoric, so seldom obtained without impurity, but with the same negative result. Each known vegetable acid has been put in requisition—as the tartaric, citric, gallic, benzoic, oxalic, and hydrocyanic, &c., but without benefit. Neither have the many alkalies now discovered, whether exhibited simply or in combination, been productive of any more satisfactory result. Almost every wood, and also the bark of almost every wood, has been alike tried for this great end, as also a numberless amount of seeds, as well as almost every bulbous root. The only substance, however, out of these extensive classes of possible remedies that has produced any very sensible result, was the cevadillo, which is supposed to contain veratrine; and in the small number of cases in which this was tried it appeared rapidly to enfeeble the powers of the patient, and to hasten his death.

In conclusion, every oil, whether fixed or volatile—every opiate, and every æther has been given—every gas, also, that the ingenuity of modern chemistry has discovered, has been inhaled without producing any sensible benefit. The extent to which these attempts to cure phthisis has been carried, has shown how very few of the substances with which nature has surrounded us are actually injurious, and is consequently a strong argument for pursuing this interesting path of inquiry; for the powerful remedies we possess in controlling and curing many other diseases is a most convincing reason that an antidote or specific remedy for phthisis will ultimately be discovered.

As the cure of phthisis is still a problem, the only hope of a family predisposed to this disease escaping is by prevention. But as the remote cause is so obscure, so the avoidance of it is a matter of vast doubt and difficulty. Still, it being well known that the artificial habits of domestic town life are more favourable to its production than those of a country life, it may be determined as a general rule, that a predisposed person should, if possible, reside in the country, accustom himself to exercise, and expose himself, when properly clothed, to the weather. It may be questionable, also, whether the habits of drinking everything hot, and everything impregnated with some foreign substance, as tea, coffee, chocolate, or beer, does not impair the digestive organs, debilitate the system, and facilitate the production of this disease. The stalled ox, artificially fed on boiled food and hot mashes, falls an easy and ready victim to this disease; and horses, it is well known, that drink foul and dirty water, although they become so fond of it as to drink none other, usually become broken-winded, or otherwise affected in the lungs.

After phthisis has formed, no question is more distressing to answer, when it is evident all our remedies are failing, than "What is next to be done?" Should the patient try change of air? Change of place, however, appears to suggest itself in all countries, but perhaps rather as a relief to the physician, than as an efficient resource for the patient. If the disease, then, break out in the Mediterranean, it is the practice to send the patient to this country to prolong his existence. Again, if it break out on the continent of America, the patient is sent to the West India Islands; and if in the West India Islands, he is sent to the continent of America. In like manner, it is the practice in this country to send the patient to the south of France, to Madeira, to Malta, or to Naples; but alas! how few return to boast of the benefits they have received.

It may be stated that diet has little influence over the disease, when once formed; and it is of little moment as to the ultimate result, whether the food of the patient be strictly animal, strictly vegetable, or whether it be mixed. It is perhaps also of little moment what sort of wine the patient drinks, and some have even drank pure æther, without sensible injury; even a strictly water diet would perhaps be little serviceable in the cure of the disease. The only useful directions, therefore, that can be given for avoiding this disease, is to live as much as possible in the open air, to change place as often as the convenience of the party permits, and perhaps in most instances to seek a more southern climate, when this point can be easily attained. The party ought also to wear flannel.

The disease being once established, we have only palliatives to assuage in some degree the symptoms. Mild opiates, as the syrup of poppies, afford great relief to the cough, and are remedies for which the patient expresses himself most grateful; the heavier opiates, however, are in general less beneficial, and often produce headache. Against the night sweats the infus. rosæ c. sp. ætheris nitrici ʒ j. 6^{tis} horis is our best palliative. When hæmorrhage comes on, it is best met by the bitartrate of potash; but as we are combating a symptom, rather than an original disease, this potent medicine is often inefficacious; and where diarrhœa threatens to accelerate the fatal catastrophe, a few doses of the mist. cretæ comp. c. opio, or else a drachm of syrup of poppies after each stool, often give a salutary check to this rapidly debilitating state. The frequency of the pulse is seldom controlled by digitalis; and even when most successful, the patient is more distressed by the medicine than benefited by the result. Whatever other symptoms may arise should be treated in the mildest manner, and with our simplest remedies, for even removing the accident, however distressing, is always followed by a declension of power, which is rarely recovered from.

Phthisis is in many parts of the continent supposed to be contagious, and the clothes and bedding of the deceased patient are immediately burnt. There is no sufficient reason, however, from any evidence afforded by the disease in this country, to suppose this disease can be communicated from one person to another. In some few instances a wife has appeared to have contracted it from her husband, or the husband from his wife; but in a disease of such common occurrence, such events must occasionally follow one another, and can hardly be considered as remarkable or as necessarily connected; and, taking them altogether, they are too few to warrant the adoption of the doctrine of phthisis being a contagious disorder.

Order IV.—Of Carcinoma.—Cancer—a Crab.

Carcinoma is a peculiar morbid growth or substance, formed principally in the cellular tissue, but likewise in every other tissue and organ of the body. It was a disease well known to the ancients, and derives its name from the appearances it gives rise to in the female breast,—the superficial veins of that part, when affected with cancer, becoming enlarged, radiating, and having thus some resemblance to the claws of a crab. In modern times the development of its laws has employed the pens of Hey, Lobstein, Recamier, Andral, Carswell, Kiernan, and of many others. This formidable disease, according to the returns of the registrar-general, destroyed 2488 persons in England and Wales in 1839.

Carcinoma may be divided into carcinoma durum and into carcinoma molle, or into hard cancer and into soft cancer. This division is established on differences observed in their course, and in their phenomena, especially those of the second stage; also from their affecting, for the most part, different organs and tissues, as well as persons at opposite periods of life. It is probable, however, that in some instances, as in cancer of the breast, the two forms may co-exist. The cases of soft cancer are far more numerous than those of hard cancer, but the ratio is not determined.

Of Carcinoma Durum.

Remote Causes.—The remote causes of Carcinoma Durum are extremely obscure. For it appears to be connected with a particular idiosyncrasy or constitution; but how that idiosyncrasy is formed has not as yet received any elucidation. There seems little doubt, however, of its being constitutional; for if the disease occurs in a part capable of being amputated, and it be amputated, nevertheless the disease returns for the most part either in that or in some other part of the body. The disposition once formed, all that depresses the vital powers appears to be productive of this disease: thus great mental depression appears to have been an exciting cause in Bonaparte, who, after his endless series of disasters, ultimately died from cancer of the stomach. In other cases it appears to be caused by mechanical injuries, and from accidental exposure to the weather.

Predisposing Causes.—Hard cancer seldom occurs till after 40, and from that period the liability increases with age. Its connexion with age may be best exemplified by stating, that its more usual seat are those organs whose vitality or functions are considerably impaired by time. Thus it seldom occurs in the mammæ, uterus, or in the ovaries till after the cessation of menstruation—nor in the organs of generation of the male till towards old age, nor in the different portions of the alimentary canal till after 40. Cancer is supposed likewise to be in many instances hereditary, and to run in families. It also very constantly occurs in persons of considerable physical power, and remarkable for their patient suffering, as well as for intellectual superiority.

Pathology.—Carcinoma durum has two stages,—or a hard or schirrous stage, and a stage of softening.

In carcinoma durum the cancerous matter is always deposited in a hard or schirrous state, and the duration of this state constitutes the first stage. It may be deposited in *masses*, or else be *infiltrated* into the cellular tissue of the organ or tissue affected; and the latter is by far the most common form. When formed into masses they are generally lobulated, dense, and often contained in a cyst; again, when these masses are cut into, we find them to consist of two substances,—the one is the cancerous deposit or growth, and the other is cellular tissue; so that the appearance of the divided surface in general is that of a hard, white, semi-cartilaginous substance, streaked by fibres radiating from the centre to the circumference. They are of considerable density and firmness, and in hardness of texture vary from hard boiled white of egg to cartilage—the knife crying as it cuts through them.

The cancerous deposit, however, is much more frequently infiltrated into the cellular tissue of the different organs or tissues it affects. In this case the affected tissue becomes gradually increased in thickness and in density by a slow deposition, or else growth of this matter, so that the part, if now divided, presents the same hard semi-transparent character as in the masses, but more interspersed with cellular tissue, the diseased portion being gradually shaded off into the healthy membrane or tissue. In the mucous tissues, as those of the stomach or uterus, the infiltrated matter has often a considerable thickness, measuring from a quarter of an inch to an inch, or perhaps even more. On the contrary, when infiltrated into the cutaneous tissue, the layer is often so attenuated as to be scarcely sensible, and the disease commences with little other appearance than a small hard pimple, or a small erysipelatous tumor, or even by a slight fissure or crack in the skin.

After a certain but indefinite period, which varies from a few months to a few years, the schirrous stage terminates, and the second stage, or that of *softening*, begins. In mucous membranes this softening usually takes place at their *surface*, or superficially,—as at the mucous surface of the neck of the uterus, or at the mucous surface of the stomach. An ulcer is the consequence of this softened state. and is at first superficial, and presents many remarkable varieties, as an inverted or everted edge—an irregular form. while its base may be granulating at one part and sloughing at another. Its course is burrowing, often penetrating between the cancerous lobules and perforating the peritoneum. The pus secreted by this sore is fœtid; often a mere ichor, or else pus mixed with blood, and so acrid as to inflame the parts over which it flows. In a few instances the large vessels participating in the disease ulcerate, and the patient dies of hæmorrhage.

The duration of the schirrous stage of a cancerous tumor, it has been stated, is very uncertain, and may terminate in a few months, or may last several years. A cancerous mammary gland, for instance, has been known to remain indolent for 14 years, and has at the end of that time been removed by an operation. This indolent character of carcinoma is limited, however, to the schirrous stage; for after it has softened, or its second stage commenced, its course is rapid, and a few weeks or a few months now generally terminate the patient's life, the part affected in no instance cicatrizing, or being again restored to a healthy condition.

Mr. Hecht, jun., has examined the chemical properties of a large schirrous mammary gland, and also of a schirrous uterus, and his analysis is as follows:—

Schirrous mammary gland.

	Grains.
Albumen	2
Gelatine	20
Fibrine	20
Fluid fatty matter	10
Water and loss	20
	72

Schirrous uterus.

	Grains.
Fatty matter	10
Fibrine	10
Gelatine	15
Water	35
	70

It is remarkable that neither of these analyses show the existence of any of the usual salts of the blood, while calcination gave for a residue only five grains of carbon. The truth of these analyses, however, is questioned by Müller; for he says he has boiled these tumors from 18 to 24 hours, and only obtained a very small quantity of gelatine; he considers them to be for the most part albuminous, and to contain some caseine and salivary matter.

Many different opinions have been entertained of the origin and intimate structure of cancer, and also of its essential character. Adams considers it to be caused by an animal of the hydatid species, which he calls hydatis carcinomatosa. While Broussais considers it to be a product of inflammation, although there is hardly a trace of a blood-vessel to be seen either in the tumor itself or in the surrounding parts. As to its peculiar nature, as developed by the microscope, Müller considers it to be characterized by a number of spindle-shaped or caudate bodies; while Mr. Kiernan considers it to be composed of enlarged and varicose capillaries. With respect to its more essential character, some consider it to be a heterologue deposit, and devoid of organic life; while others view it as a substance or growth, enjoying an independent life, and attacking every organ or tissue that has a feeble vitality.

A more important question is, whether the secretions from a cancerous ulcer are contagious; and there is every reason to believe that this loathsome disease cannot be communicated. Alibert has made dogs swallow the ichorous serosity collected from a cancerous ulcer, but the health of those animals was not impaired. Dupuytren has likewise introduced portions of cancerous parts into the stomachs of many animals—has injected the pus into their veins, and into their different serous cavities, but without producing any other result than any other irritating matter would have caused. Women also having the neck of the uterus destroyed by carcinoma have conceived and borne children, and yet neither the husband nor child have appeared to suffer in consequence. Alibert and others have likewise inoculated themselves with cancerous matter, and yet no contagious effect followed. Neither has this disease at any time been known to result from accidents incident to the examination either of the living or dead person.

In the first stage, the blood in cancer, as in tubercle, is normal in the quantity of fibrine; but in the second stage that substance is, for the most part, increased.

Such are the general laws of *carcinoma durum*, a disease which attacks principally the skin, the mammary glands, the lymphatic glands, the uterus and ovary, the epididymis, and testicle; also the mouth, tongue, and the alimentary canal from the pharynx to the rectum. Indeed, it seems limited to these parts, probably never affecting the viscera, the bones, or the muscles. It is now, however, necessary to describe more minutely the disease as it affects particular parts.

The *tongue* is sometimes the seat of this afflicting disease, which begins by the formation of a tumor, generally small, but hard or schirrous. This tumor, though long indolent, is, at the end of a greater or less length of time, the seat of severe lancinating pains, which are the precursors of its softening. The softening of the cancerous tumor at length takes place at its superficies, and the surface of the tongue ulcerates, and the edge of the ulcer is thickened and contracted, so that it is partly inverted and partly everted, while its base is hard, livid, or bleeding, and its secretions fœtid. The progress of the disease is still slow but unerring, and towards its close a large portion of the tongue is seen eaten away; the sub-lingual and sub-maxillary glands enlarged and involved in the cancerous formation, and the mouth generally in such a state that the patient is reduced to a spoon diet, swallows the cancerous ichor with his food, becomes greatly emaciated, and at last dies, perhaps of hæmorrhage, an object of loathing to himself and of pity and commiseration to others.

Cancer of the *tonsils and pharynx* is rare, although the tonsils are greatly liable to be simply hypertrophied and indurated. The disease usually begins with some difficulty of swallowing, when, if the amygdalæ be the seat of the disease, we find them enlarged; or, if the pharynx, we perceive a hard circumscribed thickened mass occupying a greater or less extent of the pharyngeal membrane. After a considerable period of indolent inaction, lancinating pains shoot through the part, followed by the peculiar ulceration, which extends in spite of every treatment, till at last the amygdalæ, the pharyngeal membrane, the soft palate, the posterior palatine bones, the glottis, larynx, base of the tongue, and the base of the skull, are perhaps all destroyed, and the dura mater exposed, and in this dreadful state the patient sinks, grateful for the relief death affords.

The *œsophagus* is more frequently affected with hard cancer than any of the preceding parts. The first symptoms are a difficulty of swallowing; and, if the probang be passed, an obstacle is felt. The disease, at first indolent, at length becomes active, and the patient falls. The morbid appearances which present themselves after death are—a more or less irregularly contracted state of the œsophagus, often extending for several inches, and sometimes reducing the diameter of this portion of the canal to the size of a common quill. Its walls are more or less irregularly thickened and indurated by the cancerous deposit, so that they may measure half an inch, an inch, and even more. The portion immediately above the strictured part is commonly pouchy, and sometimes to such an extent as to contain two and even three lbs. of aliment unable to force its way into the stomach. In general superficial ulceration has taken place at the surface of the mucous membrane, and in a few cases the ulcer burrows in its usual manner, till at length it has perhaps perforated the larynx or trachea, and the patient falls from the aliment escaping into the bronchial tubes, or into the cavity of the chest. The quantity of food which reaches the stomach in these cases is extremely small, so that the patient's hunger is never satiated ; and probably from this continued irritation the stomach presents some remarkable appearances ; being, for the most part, small, thin, and of a dark, dirty, rusty brown colour ; appearances similar to those found in the stomachs of destitute and famished patients. In some few instances, when the disease more principally affects the posterior portion of the œsophagus, the bodies of the vertebræ have become infiltrated with the cancerous matter, and Chardel mentions a case in which they were so softened that he was able to cut them with a knife.

Cancer of the *stomach* may embrace the whole extent of this organ, or any part of it. More usually, however, the affection is partial, and the parts most commonly affected are the orifices,—the frequency of the attack falling, 1st, on the pylorus, or the orifice connecting the stomach and duodenum ; 2ndly, the cardiac orifice, or that which connects the stomach with the œsophagus ; and lastly, on the body of the stomach.

When the orifices are the seat of cancer, they are constantly found contracted, but not closed, so that they appear to be in a state of permanent patency, the canal often not exceeding in diameter that of a quill. The walls of the orifices are often greatly thickened, the cancered portion varying from a few lines to a large tumor. In general, when the orifices are affected, the cancerous deposit stops suddenly at the commencement of the duodenum or œsophagus ; but sometimes it extends a considerable distance along these canals. The pylorus being affected, the stomach is often much dilated.

When the body of the stomach is affected, the greater curvature is its most frequent seat. The cancerous formation is of varied thickness, as in other parts, but it does not form those large masses which are seen at the orifices; while, in extent, it varies from the size of an inch to the palm of the hand, and even sometimes embraces nearly the whole stomach. In these cases we find the muscular fibres in the opposite states either of hypertrophy or of atrophy; for, in some instances, they form fasciculi of great size, or as big as a wheaten straw; while, in other specimens, we are not able to discover in the midst of the thickened and indurated cellular tissue more than a few discoloured, attenuated fibres, separated by wide intervals. The cancerous degeneresence is not always limited to the stomach, but often extends to the glands situated on its edge; and then enlarged lymphatics can be traced sometimes to the mesentery, whose glands are also often enlarged.

In whatever part of the stomach the disease be seated, the patient often survives till the cancerous portion ulcerates, with its usual terrific characteristics, first superficially at its mucous surface, but afterwards perhaps penetrating between the lobules of the diseased structure till it reaches the peritoneum, which, rupturing, the patient dies of peritonitis. Sometimes the greater curvature of the stomach adheres to the colon, and then these parts may ulcerate into each other, so that the contents of the stomach may pass into the colon, or the contents of the colon into the stomach, and fæcal matter be thus thrown up by the mouth. Adhesions have also been seen formed between the stomach and the liver, or the stomach and the spleen; and those viscera have been extensively destroyed. Also, when the body of the stomach has been affected, the gastric artery or vein has become involved in the disease, has ulcerated and ruptured, and the patient has died from profuse hæmorrhage. Again, when the cardiac orifice has been the seat of the disease, that portion of the stomach has adhered to the diaphragm, and its contents have passed into the cavity of the chest. In general, in whatever portion of the stomach the disease be situated, the sound portion of the mucous membrane is usually found coated with a blackish or chocolate coloured mucus.

The *small intestines* are very rarely indeed found to be the seat of cancer. Chardel, however, mentions having seen them thickened and in a cancerous state throughout their whole extent. Much more frequently, however, only a small portion of the intestine is affected, as two or three inches, which becomes thickened and contracted so as hardly to admit the passage of a damson stone. This portion pursues the usual course, sometimes ulcerating before the death of the patient; and sometimes rupturing into the peritoneum, and destroying the patient.

The *colon* is more frequently affected with cancer than the small intestines; and although the cœcum and rectum, according to the usual law of the orifices being the usual seat of the disease, are the parts most frequently affected, yet it also often occurs in the more central parts of this intestine. This disease, as in the hollow organs generally, always occasions contraction; so that we constantly find the diameter of the gut reduced in these cases, and oftentimes so much so that a substance of the size of a pea can hardly pass. In the instance of the celebrated Talma, the intestine was contracted almost to obliteration. This obstruction to the course of the fæcal matter causes it to accumulate, and to such an extent that the superior portion often becomes enormously distended, almost to bursting. Many pounds weight, or many gallons by measure of fæcal matters have often been taken from it. The walls are thickened in the usual manner, and very frequently ulcerate at the mucous surface, and the ulcer, from the irritation to which it is exposed, often assumes a hideous character, ruptures the intestine, and the patient dies of peritonitis. The extent of the cancered portion is in general not more than a few inches, but Bouillaud has seen nearly the whole extent of the intestine schirrous.

When the *rectum* is the portion of the colon affected, the cancered part is often enormously thickened from the quantity of loose cellular tissue which surrounds it being filled with the cancerous deposit. The disease may begin at the anal extremity, or it may commence at the sphincters, or at two, three, or more inches above them. At whatever part, however, it begins, it has a tendency to spread upwards and downwards; and even all the left portion of the transverse colon has been involved in it. In proportion as the disease proceeds, the canal becomes contracted, so that the fæcal matters are either passed with difficulty in a fluid state, or, if solid, are as thin as a ribbon. The disease at length ulcerates; and the ulcer, if possible, is of a more than usually frightful character, having the hard inverted and everted edge, a hard fungoid bleeding base, and penetrating deeply, so as often to perforate the bladder in the male, or the bladder and uterus in the female, and from these causes the fæcal matters may pass forwards, and the urinary secretions backwards. The patient seldom long survives the sad suffering this state of things produces.

The *bladder and ureters* are sometimes the exclusive seat of this disease, and the affection, though in a few instances general, is more commonly partial. Its characters are nearly the same in the incipient state as in the stomach, and the organ may be dilated or contracted, and its muscular coat atrophied or hypertrophied. When the disease ulcerates, it often involves the rectum or uterus, or both, so that the three cavities all communicate with each other. Cancer of the *ureters* is rarely primitive, but it frequently follows the cancerous affections of the bladder. In this case the inferior portion of these conduits is the part most commonly affected; and as this contracts, the part above is sometimes enormously dilated. Besides the ureters, the *prostate*, situated at the neck of the bladder, is frequently affected, and perhaps more so than the bladder itself. This gland, in its natural state, is about the size of a chesnut, but, when affected with cancer, it is greatly enlarged, oftentimes acquiring the size of an egg. The urethra of this portion contracts, and is now so winding or irregularly conformed, that the passage of the urine is always difficult, and sometimes suppressed, and the introduction of the catheter almost impossible.

Cancer of the *uterus* is one of the most common affections of that organ after the cessation of the menses. The neck is its most usual seat, and its posterior rather than its anterior lip. In the schirrous stage it is hard, knobbled, unequal, and its orifice irregular and half opened; while, if ulcerated, the ulcer is superficial, its edge rarely raised, or its base hard. In general the body of the uterus, a few lines above the cancered portion, is perfectly healthy, but the superior portion of the vagina usually participates in the disease. In a few instances the body of the uterus is alone affected with the cancerous deposit, and is alone the seat of ulceration. The patient sometimes dies after a very trifling ulcer has formed, sometimes not till after the almost total destruction of the uterus, and in a few instances not until the uterus, bladder, and rectum form one large ulcerous cavity.

Such is a short outline of the pathology of hard cancer, as it is generally seen by the physician.

Symptoms.—Hard cancer, in whatever organ situated, has three stages. In the first stage the part affected is hard, slowly enlarges, and has its functions impaired. At first all this goes on without pain; but as the disease proceeds, severe paroxysms of pain, or severe lancinating pains, are felt in the part, although at long intervals. The frequency of these pains increases; and the second stage is marked by a greater frequency and severity of the paroxysms, till they are at last induced by every action of the part, while in the intervals the pain is constant or nearly so, though bearable. In the last stage, or after ulceration has commenced, the pain is incessant, often amounts to agony, and is only terminated by death. The duration of each of these stages is very various. The first stage is always the longest, and may last several months, or even years. The second is always more rapid than the first, and the third than the second. The symptoms of all these stages are principally local, as the patient rarely suffers from fever except in a very few instances, and only then in the very last periods of life. He is, however, often greatly emaciated and enfeebled.

Cancer of the *tongue*, *mouth*, and *pharynx*, are demonstrable to sight, so that the existence of the disease is palpable. The symptoms are those which have been stated; or, first, the functions of the part are affected, and the patient finds some difficulty in swallowing; this is followed by lancinating pains, which become more constant; at length ulceration takes place, which spreads, annoying the patient by the fœtidness of its secretion, till he ultimately falls exhausted by the discharge, and worn down by the ceaseless agony. The frequency with which the tongue is attacked is happily trifling, or, according to M. Leroy d'Etiolles, of 633 men affected with cancer only 18 had that disease of the tongue, while, of 2148 cancerous women, only 2 suffered in that organ.

Cancer of the *œsophagus* being out of sight, its existence is more difficult to determine. The first stage of this malady is marked by some difficulty in deglutition, followed at long intervals by occasional severe paroxysms of pain or colic, often referred to the stomach. The disease proceeds, the difficulty of swallowing augments, the paroxysms are more severe, and some pain or uneasiness is felt in the intervals. The patient is now constantly spitting a thick viscid phlegm, and in the last stage he throws up his food, and at intervals after eating, which are supposed to vary according as the cancerous stricture is situated high up or low down in the œsophagus. When, for instance, the food is returned as soon as swallowed, the obstruction must be high up; if lower down, a longer period elapses; and when the lowest portion, or towards the cardiac orifice is affected, the matters swallowed often remain for six, twelve, or even twenty-four hours, when they are thrown up unchanged, or only mixed with mucosities, the pouchy state of the superior portion of the œsophagus enabling it to retain a large dinner. As little passes into the stomach, the patient eats with great appetite; but notwithstanding this large supply, he becomes daily more and more emaciated, and at length dies with a feeble slow pulse, and a collected mind, worn to the bone by hunger and by frequent attacks of pain.

The first stage of cancer of the *stomach* is marked by frequent attacks of indigestion, and occasional paroxysms of gastric colic. The patient also loses flesh; his countenance becomes sallow, and he is evidently out of health.

In the second stage the pain recurs more frequently; pressure on the epigastrium increases it; and the suffering of the patient after eating is so great, that he is led greatly to diminish his usual quantity of food, and to lower its quality. At length digestion terminates, when the pain ceases for a time and he is once more at ease. In the midst of this deranged state of digestion, the appetite is good, often greatly increased, and there is a strange contest between the desire of eating and the terror the patient feels at indulging his appetite. His bowels are constipated, his tongue clean, his pulse quiet, and he is without fever, but his emaciation denotes the inward disease under which labours.

The last stage, or when ulceration of the stomach has taken place, is denoted by the purulent nature of the matters vomited, and also by the fæcal dejections being insupportably fœtid. Under these circumstances the strength of the patient is rapidly exhausted, some delirium ensues, and the patient dies either with or without diarrhœa. It is singular that death is often pre-

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ceded by an entire cessation of suffering, as if the stomach had lost all power of re-action. In other cases vomiting of blood closes the scene, some large vessel of the stomach having ruptured; or else the patient dies of peritonitis, the ulcer having penetrated the cavity of the abdomen.

It is generally supposed that when the cardiac orifice is affected, pain immediately follows the effort of swallowing, and that vomiting takes place a few minutes afterwards. Again, if the body of the stomach be affected, that there is no difficulty in swallowing, while pain follows immediately from fruitless efforts at digestion, and vomiting some time afterwards. Lastly, that when the pyloric orifice is affected, that there is no difficulty in swallowing; that digestion proceeds, and that the pain and vomiting are delayed till the chyme attempts to pass into the duodenum. These phenomena, it must be admitted, are sometimes observed; but the difference of nervous sensibility is so great in different individuals that the rule cannot be relied on.

Cancer of the *small intestines* is so rare that few cases have been recorded of it. In a case which occurred some years ago in St. Thomas's Hospital the patient complained of great pain in the region of the liver, which was relieved by pressure, and of so severe a character that it was mistaken for the passage of a gall-stone. In three or four days the pain subsided, and the man shortly afterwards left the house. He continued well for about a twelvemonth, when he returned a second time to the hospital with exactly the same symptoms. The paroxysms, however, instead of subsiding, returned daily for many weeks. Indeed he had no ease unless he was constantly purged, and with these symptoms he shortly died.

When the *large intestines* are the seat of this form of cancer, the symptoms vary in some degree according to the seat of the disease. If the cœcum be the cancered portion, the symptoms in a great measure resemble those which have just been mentioned. When, however, the more central parts of the colon are affected, the opportunity for the accumulation of fæcal matter behind the stricture is greatly increased, and the patient, though he has longer intervals of ease, has severer attacks of pain in the bowels, aggravated by long constipation, having at first only three or four stools a week, then once a week, or once a fortnight; and Dr. Baillie gives a case in which nearly fifteen weeks elapsed without any evacuation. In this case the colon was so distended, that its transverse diameter measured above six inches; it contained a large quantity of fæcal matter, which, notwithstanding the long time it had been retained, was of a healthy character.

If the cancer is seated in the rectal portion of the colon, the first symptom is often an irritable state of the bladder; and this is followed by attacks of constipation and colic as severe, perhaps, as in the former case. If ulceration takes place, the devastation is often terrible, a communication being often formed between the rectum and bladder in the male, or between the bladder and uterus and the vagina in the female, and the patient dies from intense suffering, little relieved by our most powerful medicines.

The symptoms of cancer of the *bladder* or *prostate* are, pain and irritability of that organ, an irresistible desire to pass urine, and which, when effected, is accompanied with great pain. The urine, also, is loaded with mucus, and this secretion otherwise deranged. The prostate may be determined to be affected by the difficulty of passing the catheter, and by its increased size, causing it to project into the rectum.

The cancerous affections of the *uterus* are lumbar pains, pain on pressure above the pubis, difficulty of making water, and a fœtid discharge, mixed with blood. This disease may be made manifest to sight by means of the speculum. The examination by "*le toucher*," is liable to endless errors.

Diagnosis.—Cancerous affections may be similated by many nervous disorders, and also by chronic inflammation of the respective parts; but the long continuance of the symptoms, their gradual augmentation, the severe pain which admits of no permanent relief, together with the loss of health and slow emaciation of the party, at last give a moral conviction that it must be cancer, and no other disorder.

Prognosis.—Cancer, though long latent and its course slow, pursues its destructive progress unimpeded, and in no instance does amendment or a return to health await the patient, who ultimately falls an inevitable victim to his complaint.

Treatment.—No remedy has yet been found which can in any degree be considered curative of cancer, and the efforts of the practitioner are consequently limited to relieving symptoms, and to the adoption of such palliative measures as may prolong life.

In whatever part the disease may be situated, one great rule is to endeavour to restore the healthy functions of that part by purgatives or other medicines, and to alleviate the distressing pains the patient endures by opiates. These remedies are for a time successful, but make no impression on the disease, which silently proceeds, and the patient finally limits himself altogether to opiates The quantity of opium or other narcotic which the patient has been known to take is sometimes enormous, as five, ten, fifteen, or twenty grains of opium at a dose, or a proportionate quantity of hyoscyamus or of conium, exhibited three, four, or more times in the twenty-four hours. Dr. Powel used, however, to mention instances in which these large doses had been given with impunity for a long time, when most unexpectedly the patient had died narcotized, and apparently from merely changing the parcel of the medicine, either from some great difference in its strength, or else from its possessing qualities differing from those of the original parcel. He therefore always advised that, on having recourse to a new parcel, the dose should be reduced. But although these large doses have occasionally been given, yet it may be questioned whether they are not more hurtful than beneficial; for usually they produce headache, delirium, loss of appetite, and narcotism, so that the patient is only the more rapidly exhausted. In general, therefore, the patient does better under moderate doses of opiates, as one or two grains of opium, or its equivalent of morphine, or other narcotic, every eight, six, or four hours, than when more excessive doses are given,—a larger dose producing headache and much cerebral disturbance, without in any sensible degree mitigating the sufferings of the patient.

When the disease is seated in the colon, the quantity of purgative medicine necessary to produce a motion is often quite extraordinary. Dr. Baillie gave to a man labouring under this complaint five grains of calomel and ten grains of gamboge, but without producing even an attempt at evacuation by stool. This was followed up by a scruple of calomel and half a drachm of jalap, but even this was equally unsuccessful. Two drachms of gamboge were thrown up and quickly evacuated, but without being accompanied by any fæcal matter. On the following day another enema, containing three drachms of gamboge, was administered, but without any greater effect. Tobacco smoke was also injected in vain; the patient was then directed to take four grains of elaterium, but this made him sick without producing any evacuation by stool, and he afterwards swallowed three ounces of quicksilver, but without any result. As adjuvantia, electric sparks were sent through the abdomen, cold water dashed on the feet, a candle was passed up the rectum, but all were equally vain.

When the stomach is so irritable that it rejects everything, it is our duty to support the patient by nutritive injections, as of strong broth, egg-flip, of sago, or other fluid substances. It has been attempted to impart strength to the patient by means of milk baths, or baths of strong broths; but the skin has not any sufficient power of absorption, so that it has been found the heat of the bath has exhausted the patient in a far greater ratio than its nutriment supported him.

As a general principle, diet has no influence over the course of the disease, so that whatever agrees with the patient may be safely indulged in.

Of Carcinoma Molle, or Soft Cancer.

Soft cancer differs from hard cancer in affecting organs rather than tissues, in being generally deposited in masses, and but rarely infiltrated. It differs also from it by the products of the softened or second stage being most profuse, and by its course being much shorter, this disease being generally terminated in a few months.

Remote Causes.—The remote causes of this affection are equally inexplicable with those of hard cancer, but the peculiar disposition once formed, changes of temperature and accidental injuries are its most usual exciting causes.

Predisposing Causes.—Hard cancer for the most part affects persons in the decline of life, but soft cancer is most common in its earlier period. Thus soft cancer of the eye, and of the jaw, is often seen in children. While soft cancer of the long bones, of the liver, of the lungs, of the peritoneum, &c., is most common in adult age, or from 25 to 40. This disease affects both sexes, and perhaps in nearly equal proportions.

Pathology.—Soft cancer is generally deposited in masses, but it may be infiltrated; the former is the more common form, the latter rare. In whichever form, however, deposited, it has two stages, or a stage of induration and a stage of softening. If we examine a soft carcinomatous tumor in the first stage, we find it composed, as in hard cancer, of cellular tissue and a morbid growth or substance. The cellular tissue is of various densities, often extremely fine, and then again of considerable consistency and tenacity, and in either case radiating through the tumor and dividing its lobules. The morbid substance or growth is of many degrees of hardness, or varies from lard to cartilage, but is generally softer than in the hard cancer; it is also of a bluish semi-transparent whiteness. The duration of this stage is from a few weeks to two, three, or four months, and only in a few instances does it exceed that latter period.

The first stage passed, the process of softening, or of *ramollissement*, takes place. The first evidence of this, according to Lobstein, is, that on cutting into the tumor, and passing the handle of the scalpel over the divided surface, a milky white substance is expressed. As the disease proceeds the parenchymatous substance is changed into the consistence of soft cerebral matter, or of thickened pus; it is consequently opaque, and varies in colour from white to red, and even black. These variations of colour appear to be owing to the different quantities of blood, or of melanic matter which are effused, and with which the cancerous matter is commixed. When bloodless, and therefore white, the product is so peculiar that it has been termed cerebriform, and, when mixed with blood, medullary sarcoma, fungus hæmatoides, and many other terms, according to the different quantities of that fluid effused, which is often so abundant that the cyst or cavity at length contains little else than fibrine.

The process of softening seems to commence indifferently in every part of the tumor, as at its centre, or towards its circumference; and if the tumor communicates externally the quantity of softened matter discharged often amounts to many ounces in the course of the day. This profuseness of discharge appears to be owing to the great vascularity of the tumor; for although in the hard stage only a few blood-vessels, with coats of great tenuity and delicacy, can be traced between the lobules; yet, in the softened state, a successful injection shows them to be made up almost entirely of blood-vessels.

The duration of the second stage is generally a few weeks, and very rarely a few months. It appears to be a law, however, that anything that greatly irritates the part accelerates the process of softening. Thus, if a cancerous limb or tumor be amputated, the cancerous matter primarily deposited in a hardened state is, subsequent to the operation, deposited in a softened condition, no previous hard stage existing. It would appear, also, that in a very few instances it is deposited in a softened state, independently of any operation; and there is a specimen in the museum of St. Thomas's Hospital of infiltrated soft cancer into the sub-mucous cellular tissue of the small intestines, which appears to be of this description. It was taken from a young man, who had carcinoma molle of several other organs, and in none of which were the tumors softened. The minute organic structure of this form of disease, in its schirrous state, is probably not dissimilar to that of hard cancer, and of its vital organic character there can be no doubt. Lobstein conceives that chemical analysis has shown the soft cancerous tumor in the first stage to be composed principally of gelatine, while in the second stage albumen is the principal ingredient. There is no ground whatever for conceiving this disease to possess any contagious property.

There is scarcely any organ or tissue in which soft cancer has not been found, and by some pathologists the frequency of its occurrence is supposed to be in the following order:—the liver, epiploica, the mesentery, the lymphatic glands, the brain and nerves, the spleen, the testicles, the uterus and ovaries, the eye, the bones, the heart, and lastly the blood-vessels. It has been stated that soft cancerous matter is far more frequently deposited in masses than infiltrated into these parts. In general there is only one tumor; but there may be, as is often seen in the liver, three or four, and in some cases they are extremely numerous. Dupuytren has met with a carcinomatous heart which contained more than 600. In size they commonly vary from a millet-seed to a large egg; but when they form in loose cellular tissue, as between the folds of the mesentery or of the epiploica, or in the substance of the lungs, they have been known to weigh 20, 30, 40, and even more pounds. These tumors may also be encysted or non-encysted.

One of the most constant features of this disease, and which distinguishes it from hard cancer, is, that it often appears in many organs or tissues at the same time in the same patient. Thus it has been met with in the coats of the bladder, in the liver, and in the lungs of the same party. Another law of this disease is, that it has a great tendency to be reproduced after an operation for its extirpation. This reproduction may take place either at the part operated on, or else in some organ or tissue distant from the primary seat of the disease. A cancerous tumor, for instance, having been removed from the armpit, others soon formed under the skin of the thigh and of the neck. In another case, a cancerous testicle having been removed, a similar tumor formed in the abdomen, and many small ones were found in the lungs and in the liver; circumstances which seem to demonstrate that soft cancer is a constitutional and not a mere local disease. These are the general laws of this disease; the pathology of its more particular instances are as follows:—

The scalp, the diploï of the skull, or the surface of the dura mater, may be each exclusively the seat of soft cancer; but more commonly all these three parts are simultaneously or consecutively affected; for if the disease begins in the scalp it often extends to the cranial bones, and from the cranial bones to the dura mater, and *vice versâ.* When the disease begins in the scalp the masses are often numerous, 20, 30, or more tumors being sometimes scattered over it. When, however, they form on the dura mater they seldom exceed two or three. In either of these cases the bone may be healthy, but more usually its cancellous structure is loaded with cancerous matter, interspersed with spiculæ of bone, the substance of the bone being soft and spongy.

Soft cancer of the *brain* is occasionally, but not often, met with. Andral has collected 43 cases, most of them recorded in different medical works, to which he has added some few observed by himself. Of these 43 cases the cancerous tumor was situated in 31 in the hemispheres, in 3 in the pituitary gland, in 5 in the cerebellum, in 1 in the mesocephalus, and in 3 in the spinal cord.

In cancer of the brain the patient generally falls while the disease is yet in the first stage, and before softening has begun. The size of the tumor varies greatly; for in some cases it is scarcely bigger than a nut, while in others a large portion of an entire hemisphere has been converted into cancer. The number of the cancerous tumors also greatly varies; in general there is only one, while in some cases there are many, occupying different parts of the brain. Around the cancerous masses the substance of the brain is found sometimes healthy and sometimes softened, while serum for the most part is found effused into the cavity of the arachnoid.

Among the forty-three cases mentioned by Andral, there were ten in which cancer affected other organs as well as the brain. In some of these instances the affection of the brain was primary, but in others it was consecutive to that of other organs. In one instance it appeared to follow the removal of a cancerous testicle, the patient up to that period not having shown any symptoms of disease in any other part of the body; but shortly afterwards he wasted and died, and on examination, enormous cancerous masses were found in the mesenteric glands, in the liver, spleen, lung, and brain.

Soft cancerous tumors form not only within the cranium, but also within the *rachidian canal.* Lecat gives a case in which a carcinomatous tumor destroyed the spinous processes of the four first lumbar vertebræ. Olivier speaks of having met with many examples of cancerous tumors developed in the rachidian, dura mater, and also between the pia mater and arachnoid. In one the tumor weighed no less than eight ounces; and by its pressure, the fifth, sixth, seventh, and eighth dorsal vertebræ were absorbed, so that it presented itself externally. The same authority also gives the following instance of carcinomatous affection of the *substance* of the *cord.* The patient was a widow, aged thirty-six, who died after two years' illness, and on opening the spinal canal, a fungous growth was seen covering the whole anterior surface of the cord from the sixth cervical to the third dorsal vertebra; it was under the arachnoid, and appeared to be incorporated with the substance of the cord.

Soft cancerous tumors sometimes form in the *substance* of the *nerves*, and sometimes on their *neurilema* or coat. Sir Everard Home met with one of these tumors in the musculo-cutaneous nerve, of the size of a small pullet's egg; M. Dubois, one on the median nerve; and Dupuytren, one on the posterior tibial nerve; while in another case he found the trifacial nerve transformed into a cerebriform substance.

Soft cancerous matter is sometimes infiltrated into the tissues of the eyelid—its seat the free edge, or else the commissures of the eyelid. When the external commissure is affected, the disease often begins with a painful fissure with a grey base; an ulcer at length forms, which spreads with edges inverted and everted, often destroying the whole of the eyelid and other portions of the face. Cancer of the internal commissure begins generally in the caruncula lachrymalis, which is swollen, hard, schirrous; this at length ulcerates, and either so compresses or involves the lachrymal duct, that it is accompanied by a continual discharge of tears, or a "watery eye."

The cancerous deposit may be *infiltrated* or formed into *tumors* in the *eye.* This disease sometimes begins in the conjunctiva, which becomes fungoid, hardened, and disorganized. In other cases it takes place among the laminæ of the transparent cornea, which ulcerate, and the ulcer having an elevated edge and a schirrous base, invades the surrounding parts. Again, the cancerous formation may affect the deeper-seated membranes, and more especially the retina and choroid membrane; and in these cases a tumor forms, which thrusts the eye out of the orbit, displaces the vitreous humour, dislocates the crystalline lens, and impairs the action of the iris, and these parts afterwards ulcerating, the sight is shortly destroyed.

Soft cancerous tumors occasionally form in the cellular tissue of the *orbit.* The majority of these tumors are of rapid growth, of a soft medullary structure, and are quickly reproduced if removed. They are of such magnitude that in most cases the eye protrudes in a most unsightly manner, while vision is impaired or wholly lost by the pressure and extension of the optic nerve. But although the eye is often displaced to a great extent, yet vision is sometimes preserved. These malignant tumors are most frequently met with in childhood, though they may occur at all periods of life. In the majority of cases similar tumors co-exist within the cranium along the optic nerves, or in their tract behind the commissure, extending to the optic lobes, and even to the cerebellum.

The different structures of the *face* and *mouth* are also often the seat either of soft cancerous infiltration or of cancerous tumors. Thus we often find intractable infiltrated ulcers of this description of the integuments of the nose, of the cheek, and of the mouth; or, of 633 cases of men affected with cancer, 165 had cancer of the lip, while of 2148 women, only 54 had this affection of the lip, a difference which M. Leroy d'Etiolles conceives results from the greater use of the pipe among men, and especially of the short broken pipe, which the French term "*brûle gueule.*" The cavities of the facial structure are also the seat of cancerous tumors, which give rise to great deformities. These growths often commence in the sinuses connected with the cavity of the nose, show themselves from the nostrils, protrude through the orbit, and get into the mouth behind the palate, through the tuberous processes of the superior maxillary bone, or project through the alveolar processes. Sometimes, though rarely, these tumors form in the frontal sinuses, or sprout from the antrum. The parotid gland is also occasionally the seat of this affection, and is the more formidable from its connexion with the carotid artery.

The alimentary canal is occasionally the seat of soft cancerous infiltration, or else of tumor. These tumors have often been found in the *stomach.* A woman, previously in perfect health, died at the Hôpital Cochin of a fractured thigh; she was opened, and four cancerous tumors were found at the posterior face of the stomach. Andral also met with a large cancerous tumor in the stomach of a young man aged twenty-two. In the Museum of St. Thomas's Hospital there are two specimens of these large cancerous tumors of the stomach, which occurred in the practice of Dr. Williams. The patient generally dies before ulceration takes place, but should he survive that result, the ulcer is usually of a most irregular and hideous character.

The soft cancer does not appear to exist nearly so frequently in the intestines as in the stomach; and, as has been stated, there is an almost unique specimen of infiltrated soft cancer in the coats of the small intestines in the museum in St. Thomas's Hospital.

Soft cancer of the *liver* is by no means unfrequent, yet Cayol conceives that previous to 1833, when he described it, no account of it existed. The pathological phenomena of this disease are, that on opening a patient that has died of soft cancer of the liver, we observe the surface of that organ marked with one or more slightly projecting tumors covered by the peritoneal coat. These are white, opaque, and slightly depressed in the centre. When the liver is cut into we often find others less superficial; so that their number varies perhaps from one to five or six, or even more, while in size they vary from a pea to an orange. In some instances the liver appears infiltrated with this substance, so that it occupies three-fourths of a lobe.

The patient usually falls while the tumors are yet in the schirrous stage, or semi-transparent, radiated, and of a moderate hardness. In the greater number of cases they are enveloped in cellular tissue, and can readily be dissected out with the handle of the scalpel, when a perfectly smooth cavity is left; but in other instances there is unquestionably continuity of tissue between the liver and these tumors. If the patient survives this stage, the first step towards softening is the appearance of a few blood-vessels penetrating between the lobules, and perhaps a slight effusion of blood in the centre of the tumor. This is followed by a gradual conversion of the cancerous matter into a cerebriform substance, and which proceeds till the whole is so broken down as to form a sort of abscess, which may burst into the peritoneal cavity, into the stomach, the duodenum, or colon. It is singular, says Cayol, that the secretion of bile is little interrupted, even in those cases in which large portions of the liver are affected, for the bile in the gall-bladder is not sensibly altered either as to quality or quantity. The substance of the liver also around the tumor is healthy. The jaundice, which sometimes, but by no means constantly, accompanies this affection, Cayol considers to depend on the pressure made by the tumors on the gall-ducts. Besides cancer of the liver, Bouillaud has seen a schirrous state of the gall-bladder, and he also mentions having met with a cancerous tumor, of the size of an almond, at the embouchure of the hepatic veins at their junction with the cava.

Soft cancer of the *pancreas* is by no means common; for although many patients who die of cancer of the stomach or liver have cancerous masses more or less considerable in the neighbourhood of the pancreas, yet when the latter viscus is examined it is generally found without alteration. Primary affection of the pancreas is still more rare; and only a few cases have been met with out of many thousand bodies examined. The celebrated President, De Thou, however, is supposed to have died of this disease. Dr. Bright, in the 18th volume of the *Med. Chir. Transact.* has given some instances of malignant disease of this viscus. Mr. Mayo has also given a case in which the pancreas was considerably enlarged, and of nearly cartilaginous hardness, except some spots, which were soft, with the appearance of medullary sarcoma. A case also recently occurred, in which the pancreas, besides being enlarged, was softened and red in consequence of the large quantity of blood which had been effused.

The soft cancer of the *spleen* is rare, and its characters not well understood. Two cases, however, lately died in St. Thomas's Hospital with dropsy and enlarged spleen, and on examining them a reddish broken-down tumor was discovered in each of their spleens, and which appeared to be soft cancer, modified perhaps by tissue.

Soft cancer of the kidneys is more common, and in the hard stage presents all the characters which have been remarked as occurring in the liver. But the kidney acquires a greater size, and has been said to weigh as much as 40 lb. when thus diseased. One case is given, in which the vena cava was obliterated by its pressure. When the disease passes to the softened stage, the product varies greatly in character; sometimes the tumor being converted into a white cerebriform matter, and sometimes filled with pure fibrine—differences which are probably owing to differences in the quantity of blood effused.

The *bladder* is sometimes the seat of soft cancer, and which may be infiltrated or formed into masses. More commonly it assumes the form of fungous vegetations projecting into the cavity of this viscus, and sometimes entirely filling it. A case of this description occurred to Bouillaud, at La Charité, in 1828. The tumor was as large as the fist, and resembled a cauliflower excrescence, and filled the entire cavity of the bladder; and a similar but less formidable case occurred recently at St. Thomas's Hospital.

The *uterus*, like other organs, is occasionally the seat of this disease. It may be infiltrated or formed into masses, but the former is the most common. In the schirrous stage, these tumors are not so transparent as those of the liver, but more resemble lard, and generally occupy the body of the uterus. They are of various sizes, or from a pea to a small egg. When infiltrated it is most generally the neck of the uterus which is diseased, and the ulcer which follows has generally a soft base and a smooth edge.

Bayle and Cayol question the existence of soft cancer of *the ovary;* but in women of a " certain age," says Bouillaud, this disease is not rare, and he gives a case in which the two ovaries were so enlarged as to meet; the left ovary being the size of an ordinary liver, and the right that of a fœtal head. M. Maingauli has communicated to the Académie Royale de Médecine, a case in which the ovary thus enlarged weighed 60 lb.

A more common seat of soft cancer is the folds of the *mesentery*, and the tumors which here form are of the largest magnitude—the cancerous formation sometimes occupying the whole of the abdomen, so that the party, if a female, is often larger than at the most advanced periods of pregnancy; or, if a male, has the appearance of one labouring under ascites. These tumors present no novel appearance; they are lobulated, and extremely vascular. The patient usually falls before they soften, but occasionally he survives till after that period, when the different lobules may be seen in every stage and degree of hardness and of softening. In most cases, however, these tumors form adhesions to the walls of the abdomen, and in a few instances ulcerate, so that the tumor softens and bursts externally, when the discharge is generally enormous, and rapidly destroys the patient. It is remarkable that, on examining the bodies of patients who have died in this state, we often find considerable quantities of the softened cerebral matter in the larger blood vessels, and also in the cavities of the heart.

Soft cancer of *the lung* was perhaps first pointed out by Bayle. It presents itself under two different forms—of masses and of infiltration, and may be complicated with tubercle or other disease of the lung. Bouillaud much over-estimates the frequency of this disease when he states, that out of 200 cases he found four of pulmonary cancer. He gives the case of a young girl with cancer of the lachrymal duct and carcinomatous polypus of the nose, in whom the superior lobe of the lung was transformed into one compact lardaceous mass, of a yellowish white, and without a trace of blood-vessels or nerves. It was not softened, and some large bronchial tubes not obliterated could be traced through it. In another case, the entire lung was converted into a cancerous mass, in the substance of which some pulmonary vesicles could be distinguished, though atrophied. The bronchial glands are also occasionally the seat of this affection.

Cancerous masses of greater or less size are sometimes developed in the subjacent *pleural cellular tissue.* In a case given by Velpeau, four cancerous masses existed between the ribs and the pleura. In a case also that recently died in St. Thomas's, a mass of serous cysts, as big as a large apple, and adherent to the false ribs, had become the seat of cancerous deposit. It is in the cellular tissue of the mediastinum, however, that cancerous masses more often form, and sometimes so large as to compress the aorta, vena cava, pulmonary artery, or phrenic nerves. Dalmas has seen the superior vena cava obliterated from this cause. In other cases they cause absorption of the bones of the sternum, and form a projection of considerable extent under the integuments. Bouillaud has seen one which was mistaken for aneurism of the aorta.

Soft cancer of the *heart* appears to have been first described by M. Carcassonne, in the *Mémoires de la Société Royale de Médecine*, in 1777-8, and it has since been seen by most pathologists. In one case given by Laënnec, there were several cancerous masses about the size of a nut in the muscular substance of the ventricles; while in another it was deposited in layers one to four lines thick along the coronary vessels, between the pericardium and the heart. Also in a case by Trélat, the walls of the right ventricle were an inch and a half thick from infiltration of cancerous matter, while the septum auriculi was transformed into a schirrous mass an inch and a half thick. The septum ventriculi was likewise in a cancerous state. Velpeau also gives a case in which the walls of the heart contained about a dozen cancerous masses of various sizes, the biggest being as large as a pigeon's egg. Sometimes the *pericardium* has been found involved in the disease. Cancer of the heart has rarely been seen, except when similar disease has existed in other parts of the body.

Cancer *mammarum* rarely attacks the male, but is almost peculiar to the female. It is scarcely ever seen before 20, sometimes between 20 and 30, more frequently between 30 and 40, but is most common from 40 to 55. From the age of 60 to extreme old age it becomes more and more rare. Its usual course is as follows:—

A woman, on touching her breast, discovers a small tumor or hardness, which causes her so little inconvenience that she neglects it. The hardness augments and the tumor increases, and though at first perhaps not bigger than a nut, reaches the size of a duck's egg. At first it was round, circumscribed, and moveable under the finger, but at length its surface becomes unequal and knotted, as well as adherent to the skin or muscle. It may still, however, be handled without pain or suffering, but is the occasional seat of lancinating pain. The disease increases, the surrounding cellular tissue becomes infiltrated with the cancerous deposit, and the lymphatic glands of the armpit become enlarged. The tumor is at length salient; the skin covering it red or livid; the nipple sunk and depressed; and, at last, the skin cracks. This crack or chap enlarges into an ulcer, which burrows in every direction, whose edges are thickened and everted, and which discharges a copious and fœtid sanies, and at length frequent hæmorrhage takes place. The disease pursues an unmitigated course; and at last the patient, worn out by incessant suffering, and exhausted by a constant discharge, gladly resigns a life so long embittered. Such is the more ordinary course of cancer of the mammæ; but this disease has endless varieties, both in its progress and in the nature of its discharge, which our limits prevent us from describing.

Symptoms.—Soft cancer, when the tumor has space to enlarge, forms and runs its course, with a few exceptions, without pain. In the close cavities, however, as the brain, the patient's sufferings are often severe from the pressure the tumor produces on the nerves. Cancer of the mammæ and testicle is of a more mixed character, and the latter stages of the disease are often accompanied with great suffering.

When cancerous tumors form in the *scalp*, the patient suffers no pain, but ulceration at length takes place, and the patient falls from hectic and exhaustion.

Soft cancer of the *brain* has no characteristic symptom. The lesions of the intellect are by no means constant or uniform. Indeed in by far the greater number of cases the intellect has continued unimpaired. In other instances, however, the mind has become obtuse; the memory impaired; and this has been followed by delirium, insanity, or epilepsy. Lesions of motion are also not more constant, and sometimes are altogether wanting. When they do exist, the result is a slow-coming palsy, affecting one or more limbs, as an arm or a leg; or the patient may be paraplegic or hæmiplegic, with affection of the bladder. The palsy likewise may be complete or partial, confined to the extensor or flexor muscles, and therefore accompanied by contraction.

Lesions of sensation are likewise by no means constant; thus headache, although frequent, is not present in every case, and when present offers the greatest difference in intensity, being sometimes slight, so as hardly to be remarked, and at others so severe as to form the prominent feature of the disease. Its character also varies, being sometimes dull, and sometimes lancinating; sometimes constant, and sometimes intermitting. Neither does it always designate the seat of the disease, being sometimes general when the disease is very limited. The pressure on the brain likewise causes the pain often to be reflected. Thus, in some persons the pain is only felt in the arm or trunk, while others suffer from a singular sensibility of every part of the cutaneous tissue, so that the slightest touch is followed by the most excruciating agony, while in others the patient is annoyed by the most insupportable itching.

The functions of the senses have in some instances been impaired, whether the nerves have or have not participated in the cancerous affection. Thus some persons suffer a gradual loss of sight. In Dr. Wollaston's case, vision was so singularly affected that he was able to see only the latter halves of words. In another case the patient became so deaf and so blind that the only mode of conversing with him was by the fingers. While Andral mentions a girl who lost the use of every sense, as also of motion, although her intellect remained perfect.

It frequently happens that the general health is good till a very late period; but in other cases the patient is troubled with frequent vomiting, constipation, and retention or else incapability of holding his water.

When cancer forms among the meninges of the brain, as long as the cranium is imperforate, the symptoms are the same as those of the brain. When at length, however, the cancerous tumor has perforated the walls of the cranium, the pain perhaps ceases, but ulceration takes place, and death soon follows.

Nothing is more variable than the duration of cancer of the brain. Sometimes death takes place in a few months, while in others years elapse before the fatal catastrophe. In either case the patient may fall seized with convulsions, epilepsy, or coma, or else die exhausted from ulceration of the nates, sacrum, &c.

Cancer of the *vertebral column* is generally marked by paraplegia, incontinence of urine, numbness of the lower extremities, sloughing of the nates, and death. The palsy which results may be either complete or accompanied by contraction. In one woman, aged 52, during the period of four months, her limbs could not be flexed without producing most atrocious pain. At length her legs became contracted, and to such a degree, that the heels were in contact with the glutei muscles, and the knees with the chest, and extension was now as painful as flexure had been before. In some few instances, as long as the palsy is incomplete, the pain in the back is long continued and extremely severe, and accompanied by convulsive twitchings, which do not subside till the palsy is complete. The duration of this affection varies from a few months to two or three years.

Soft cancer also often forms superficially in the *subcutaneous tissue*, and is usually accompanied with similar forms of this disease in other parts of the body. The tumor thus formed, if removed by an operation, is almost always re-produced by a more rapid growth, and in a more softened state, and consequently runs a much quicker course than the original tumor. Soft cancerous matter is also frequently deposited in large masses, as well as infiltrated, into the *adipose* and *cellular membrane*, and also among the *muscles* and in the substance of the *bones*. Whenever the fungus comes in contact with the muscles, says Mr. Hey, they lose their natural colour and become brown. They also lose their fibrous appearance, and cannot in every part be distinguished from adipose membrane. The fungus as it increases in bulk does not render the integuments uniformly thin, as in the case of an abscess; but they continue to feel thick as usual, over the tumor which forms beneath them, and which at length ruptures them. When the bone is the seat of this affection it greatly enlarges, especially its cancellous structure, which becomes filled with cancerous matter, and, as the disease proceeds, the whole limb becomes more or less infiltrated with it.

Soft cancer of the *testicle* is not unusual, and its schirrous stage has no peculiarity. In the second stage the product is either a soft colourless cerebriform matter or a cerebriform matter streaked with blood, or else it may be the seat of more considerable hæmorrhage. The cord often participates in the affection, adheres to the pubis, and fixes the testicle there. The lymphatics and their glands often undergo the same degenerescence, and by their pressure have obliterated the large vessels with which they lie so nearly in contact. In the last stage the tunica albuginea ruptures, ulceration follows, and fungous growths springing from its base give rise to a foul fœtid discharge, accompanied by frequent hæmorrhage. The cancerous testicle has been seen to weigh seven pounds.

On examining the bodies of those who have died of soft cancer in its softened state, it is not unusual to find cerebriform matter in considerable quantity in the veins, and it may often be traced even into the cavities of the heart.

Soft Cancer of the Periosteum.—Mr. Frogly has given two cases of a whitish elastic hard tumor of

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the thigh resembling cartilage, but rather more transparent, and of considerable size, the diameter of one measuring 55½ inches. On cutting into it it was found to consist of numerous cysts containing several pints of a yellow tenacious honey-like fluid, and was evidently a serous cyst which had undergone cancerous degeneration. The second case was similar.

The cancerous tumors formed on the *nervous trunks* are ordinarily moveable, but very painful when touched, so that the patient for the most part willingly submits to an operation. If the operation be performed, as a portion of the nerve must be excised, the patient, as a consequence, necessarily suffers from a greater or less degree of palsy and insensibility of the parts to which the nerve is distributed.

Soft cancer of the *palate*, *mouth*, and *face* are seldom accompanied by pain, unless it results from pressure made on the surrounding parts.

In the stomach large cancerous tumors often exist without the slightest pain. A man, about 50, was admitted into St. Thomas's Hospital: he was greatly emaciated, and evidently out of health; but he ate heartily, slept well, had a quiet pulse, and made no complaint of sickness. A few hours before his death, however, he did vomit. On examining this patient a soft cancerous tumor, as big as the fist, was found in the stomach. In another emaciated patient, admitted for dropsy, there was no sickness, nor any complaint of pain; after death, however, a similar tumor was found in the stomach of this man. In another case, in which there was cancerous infiltration in the coats of the *small intestine*, none of the functions of the bowels were impaired.

The *pancreas*, from its close texture, perhaps gives more evidence of this affection; and the symptoms are, some pain in the epigastrium, vomiting, and headache, with great emaciation. Mr. Mayo, however, gives a case in which the patient took a good deal of food, and complained of nothing except a pulsative pain of the ear. The symptoms are consequently not constant; and unless a tumor can be felt, the diagnosis of this disease is still very imperfect.

Cancer of the *liver*, according to the general rule, is often void of pain. A patient was admitted into St. Thomas's Hospital with his mind greatly agitated, so that his friends were alarmed lest he should commit suicide. He complained of racking pains in all his limbs, which allowed him no rest, and which were considered to be rheumatic. The pains shortly subsided, but he did not recover his health, so that it was plain he was labouring under some structural disease, but of what nature could not be determined. On examining him after death, cancerous deposits were found in the liver, intestines, and heart.

The *spleen* has a similar exemption from pain in this disease; but the viscus enlarges, dropsy follows, and death is the consequence.

Tbe *bladder* seems equally insensible. A patient laboured under ulceration and suppuration of the elbow-joint, and he shortly afterwards passed blood in his urine. Of this latter complaint he appeared to die; but, except an irritable state of the bladder, he suffered little or nothing in the vesical region. On examining him a soft cancerous tumor was found in the bladder.

Cancerous formations sometimes take place in the *lungs*, and yet it is impossible to distinguish the affection during life from phthisis, a disease in which there is no pain. A patient very recently died, in whom a cancerous tumor existed under the false rib; but, although troubled with incessant cough, his pulse was quiet, and he suffered no pain. Similar tumors have been found in the heart, not only without pain, but without any interruption of the circulation. The large cancerous masses which sometimes form in the duplicature of the mesentery or omentum are equally free from pain, and are frequently mistaken for ovarian dropsy, a disease whose greatest inconvenience is its bulk. The kidneys also have often attained a great size from cancerous deposit, and destroyed the patient without pain; the symptoms being, great emaciation, hæmaturia, attacks of suppression of urine, and perhaps dropsy. When the disease has formed externally, or among the muscles, there is likewise no pain. The patient assured me, says Mr. Hey, that he had walked without pain in his knee a week before his admission into the infirmary. These instances are sufficient to establish the general law of the disease being unaccompanied by pain, and that the inconvenience is generally local till ulceration or softening takes place. The duration of this disease, it has been stated, is very various, terminating in some cases in a few months, but in others lasting two or three years.

Diagnosis.—It is impossible to distinguish diseases depending on soft cancer from those caused by tubercle; but in parts where the tumor can be felt, its greater size, the greater *embonpoint* of the patient, and the general absence of hectic, afford in general a sufficient diagnosis between the two diseases. When the tumor cannot be felt, soft cancer can only be distinguished from the similar functional diseases it gives rise to by the intractable nature of the complaint, its slow but undeviating course, and, in a word, by a state of things which no ordinary derangement of the functions of an organ can account for.

But these are not the greatest difficulties in the diagnosis of soft cancer; for tumors occasionally form, as in Mr. Frogley's case, in the thigh, in the antrum, in the jaw, in the mammæ, and in other parts of the body, which similate tumors in the first or schirrous stage of soft cancer, both in form, size, seat, and intimate structure, but which have no tendency to soften or to take on a *malignant* character. Ambroise Paré, Morgagni, and the earlier writers have spoken of tumors of this character; but Bayle is the first author who can be said to have treated expressly on them, and he has described them as fibrous *degenerescences* of the mammæ. He says these tumors, at first fleshy, at length become cartilaginous or osseous, but do not become *cancerous*. Sir Astley Cooper has described them as *chronic mammary tumors*, attacking in general young women between 17 and 30, but which have nothing in common with cancer, as the patient preserves her best health. He describes them as of extremely slow progress, superficial, moveable, and lobular in structure. Sir B. Brodie also admits the existence of these tumors, which he describes as feeling "like *schirrous*, and which on cutting into, it feels like *schirrous*, so that I can give no other name to it," and which has no tendency on being removed to return. Cruveilhier describes them as fibrous bodies, as varying in size from a millet-seed or a cherry to the head of an adult, as having no tendency to cancerous softening, or to be reproduced when amputated, and are not otherwise inconvenient than from their size and weight. He has met with them in old women of 80 and upwards at

Salpêtrière, and in whom they had formed in early adult life. It is difficult to speculate on the comparative frequency of these benign tumors; but supposing cancer always to be reproduced after removal, the result of operations would give nearly an equal proportion of cancerous and fibrous tumors. But these data are probably unsure, and the subject is still open to much further and interesting investigation.

Prognosis.—This disease has in all instances proved fatal when an operation has not been practicable. The disease appears capable of being removed from the mouth with success; and the patient has survived amputation of the extremities, or its removal from a superficial position. The great majority of cases, however, have died, or else the disease has shortly returned and quickly proved fatal.

Treatment.—At present no remedy exists for this form of disease. Every general mode of treatment has signally failed, and its cure therefore depends on a specific medicine being discovered. The treatment in the actual state of medicine is, consequently, most unsatisfactory, and entirely palliative, or by opiates and attention to the general health.

If the patient lives moderately, diet appears to have little effect on the course of the disease.

ORDER V.—OF MELANOMA OR MELANOSIS.

Pathologists have given this term to a morbid production of a black or brown colour. The disease was first described by Laënnec.[*] In 1821 he published some new instances of it, and since that period it has been more particularly studied by Dr. Carswell and MM. Trousseau and Leblanc. This affection is not limited to man, but occurs in the horse, especially when glandered, and is more common in the dappled grey than in that of any other colour. It has also been found in the dog, the cat, the rabbit, the rat, the mouse, and other animals.

Remote Cause.—The only clue we have to the possible causes of this disease is mentioned in Chossat.[†] In six frogs, whose deaths had been induced by a long inanition, or from nine to twelve months, the red blood had completely disappeared, and was replaced by a black fluid similar to a dilute solution of sepia or of ink, which filled all the vessels of the limbs, mesentery, lungs, and brain. But the organ which was more remarkably the seat of this general melanosis was the liver, whose hepatic colour was changed to black, and stained paper like Indian ink, and the stain was not effaced at the end of six years.

In the human subject the remote causes of this disease are little understood, and it occurs in so few instances that it appears connected with peculiarity of constitution rather than peculiarity of cause. One might imagine it was some local atrophy of the parts, did it not generally occur in greatly hypertrophied and otherwise diseased livers.

Predisposing Causes.—Andral met with a decided melanotic induration in the superior lobe of the left lung in a girl 9 years old; and Lobstein met with an instance in an old woman between 80 and 90. The most common period is between the ages of 30 and 50, and it is a disease which equally affects both sexes.

Pathology.—Melanoma, like cancer and tubercle, may exist as a tumor or mass, or may be infiltrated into the various organs and tissues of the body; and, lastly, it may likewise be deposited at the free surface of the mucous and serous membranes.

When melanoma exists in masses, Laënnec has attributed to it two stages, or a stage of hardness and a state of ramollissement. In the hard stage the mass is of considerable firmness, so that it has been compared to suet, or to the substance of the lymphatic glands. The colour is generally of a soot-black, and it gives a stain to white paper or linen as deep as Indian ink; but in other instances it is of a yellowish-brown or bistre tint. In form the masses are sometimes spherical, sometimes irregular, and at others not like any geometrical figure. In size they vary from a millet-seed to a goose's egg; and Andral speaks of having met with tumors so enormous as to weigh thirty-six pounds. They are occasionally lobulated, and the lobules divided by cellular tissue. Laënnec considered that after an uncertain period the hard stage passed into the stage of remollissement, the tuber softening from its centre to its circumference, till at length the whole is converted into a black or brownish pulp or *bouillie*. He also thinks that the tumor having softened, ulceration may take place in the surrounding tissues, and the softened matter escape, as from an abscess, and the cavity perhaps ultimately cicatrize. Such is the course ascribed by Laënnec to melanoma. The fact, however, of the stage of ramollissement is disputed,—not that cysts containing fluid melanoma have not been met with, but because some pathologists conceive it may have been deposited in a fluid state.

Melanoma may be encysted or non-encysted; Laënnec has met with encysted tumors in the liver and the lungs; and Breschet has seen them in different parts of the cellular tissue. On the contrary, all the cases seen by Andral have been non-encysted, the tumor adhering more or less intimately to the surrounding tissues. Although neither nerves or blood-vessels have been traced into these tumors, Laënnec considered melanoma to be an organized growth or tissue; but Andral is of opinion that it is a veritable inorganic compound, and if sometimes the seat of vital phenomena, that those are owing to the living membrane which surrounds or is imprisoned in the mass. Chemistry does not greatly assist us in this difficulty. It has merely determined the melanic matter to be inodorous, insipid, opaque, miscible with water or alcohol, and as putrefying slowly. It is essentially, according to Thenard, compounded of carbon; according to Clarion, of albumen and of a peculiar colouring matter; according to Barruel, of the colouring matter of the blood united to fibrine; and lastly, M. Foy has given the following analysis:—

Albumen	15·00
Fibrine	6·25
The black principle, evidently carbonaceous or altered cruor . . .	31·40
Water	18·75
Oxyde of iron	1·75
Sub-phosphate of lime	8·75
Hydro-chlorate of potash. . . .	5·00
Hydro-chlorate of soda	3·75
Carbonate of soda	2·50
Carbonate of lime.	3·75
Carbonate of magnesia	1·75
Tartrate of soda	1·75

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[*] *Bulletin de l'Ecole de Méd.*, 1805. No. 2.

Sur l'Inanition, p. 74.

Besides being deposited in masses, melanoma is often infiltrated into the substance of organs, as of the liver, or of the lungs, or into the web of the mucous and serous tissues, especially after chronic inflammation, as in dysentery. It is also often secreted at the free surfaces of the mucous and serous tissues in a liquid state. Thus, in chronic peritonitis, and especially if a false membrane has been formed, the surface is often coated partially or generally with a black fluid. Andral gives a case in which he collected fluid melanic matter in considerable quantity from the free surface of the mucous membrane of the small intestines. It follows, therefore, that melanoma may be deposited in a solid state either in masses or in a state of infiltration; and likewise that it may be deposited in a liquid state at the free surface of membranes. There is nothing to show that melanoma is of a malignant nature; at least it appears to constitute an integral part of the bronchial glands for an indefinite period, but without giving rise to any symptoms. It often exists in many organs or tissues at the same time, and may co-exist with either tubercle or cancer. After having thus stated its more general laws, we shall proceed to give a few particular instances of it in the different organs and tissues.

Dr. Halliday found melanic tumors of the *dura mater*, and Lobstein has seen melanosis of the *optic nerve* on the left side, the melanic matter having penetrated two lines deep into the substance of the *brain*. The man died of apoplexy. Chomel has likewise given an interesting case of melanic matter situated in the cellular tissue at the base of the *orbit*.

Cruveilhier has met with melanic tumors in the *stomach;* and Andral has observed them many times in the sub-mucous cellular tissue of the *alimentary canal*, their mean size being that of a nut, and their most common seat being the colon. It has been stated that melanic matter is often found at the free surface of the mucous membrane of the stomach and intestines. Some pathologists also consider the black vomit and also melæna to be of this character. It has also been found incorporated in the mucous tissues of the alimentary canal, giving it a grey tint. Melanic matter has also been found under the *peritoneum* in masses; likewise in a fluid state at its surface, and also incorporated in its tissue.

A splendid specimen of melanosis of the *liver* is to be found in the museum of St. Thomas's Hospital. It has been observed in all these liver cases that the liver is enlarged. Chomel met with a melanotic liver in a dancing-master which weighed 14 lb. 7 ounces. It contained masses varying from the size of an oat to a pullet's egg. The gall-bladder and ducts were nevertheless filled with bile.

The *lungs* are, of all organs, those which are most frequently the seat of melanosis, and the melanic matter appears often to exist in them without affecting, in any degree, their functions or the general health of the patient, so that it can hardly be considered in these organs as a morbid product, and hence it has been termed, *melanose naturelle.* It has been found in masses and in a state of infiltration at the surface, and in the substance, of the lungs. It is also secreted by the free mucous surface of the *bronchial membrane*, marking the expectoration. The *bronchial glands* are also often loaded with it, and similar tumors have also been found under the *pleura costalis.*

Andral has seen a patch of deep black, as broad as a two-franc piece, and from seven to eight lines in thickness, under the serous membrane covering the *heart;* and a similar case is related in the *London Medical Repository* for 1823. Breschet, moreover, met with an instance of melanoma among the muscles of the heart. Melanoma has likewise been found in masses in the coats of the arteries; and in one instance Andral found them as large as a pea and as hard as a calculus, and therefore perhaps mixed with phosphate of lime.

Rayer has met with melanosis of the *kidney*, the melanic matter being deposited in the cortical substance, and the substance around them healthy. In some few instances, the urine is passed almost of a black colour, leading to the supposition that these organs may secrete fluid melanic matter.

The *lymphatic glands* of different parts of the body are frequently the seat of melanosis. The bronchial glands, it has been stated, are often filled with this black matter, and, under these circumstances, are greatly enlarged. Enormous masses of melanoma have been found in the pelvis and before the vertebral column, forming a sort of chaplet, and which Andral conceives to be lymphatic glands. It has likewise been found in the mammæ, and apparently affecting the glandular structure rather than the adipose or cellular tissue; and Dr. Rownel has reported a case of cancer of the breast from which flowed matter as black as ink. Breschet gives the case of an old woman that died at Salpêtrière of ulcerated melanosis of the groin; and many similar tumors, varying in size from a nut to a pullet's egg, could be traced along the groin. Melanic matter has also been found in the thyroid gland, in the ovaries, and in the uterus.

Many authors have spoken of melanoma of the *muscles* and *bones.* Dr. Halliday found it in the sternum and in the ribs, and also in the parietal and occipital bones, which were coloured black. In this case, the bones were more fragile than usual, but the periosteum presented no marks of disease. Lobstein met with it in the left femur, and found several melanotic tumors adherent to the *periosteum.*

Melanotic formations have been found in many different parts of the sub-cutaneous cellular tissue in the form of round masses of various sizes, and which have ultimately ulcerated. Alibert speaks of them as spherical in form, and of the size of a juniper berry, and when cut into resembling the parenchyma of a truffle; while Breschet and Jurine compare them to mulberries. A remarkable case of this kind was, a few years ago, in St. Bartholomew's Hospital, the melanic tumors covering nearly the whole back. These tumors, if removed, are said to be re-produced.

Symptoms.—The symptoms of melanoma have not been determined. In the lungs the deposit produces no sensible effect, except the tumors are large, and thus impede the functions of the different organs of the chest. In the liver, the organ is enlarged, and otherwise diseased, but neither pain nor other symptoms mark the disease. In the bones it occasions fragility; in the lymphatic glands and sub-cutaneous tissue, ulceration; but it does not appear, in any case, to be attended with pain except such as may result from the pressure of the tumors on the surrounding parts. When ulceration takes place the patient has died; but he would equally have died from the ulceration had no melanic matter been found; and this is all that can be fairly said to be known respecting the symptoms of melanosis.

Diagnosis.—The diagnostic symptoms between melanoma and many other tumors are not determined; when, however, it is superficial, the colour plainly distinguishes it.

Dr. J. C. Gregory examined a patient that died in the Infirmary at Edinburgh, who had been employed for the last 10 years of his life in the coal-mines at Dalkeith, inhaling coal-dust at every breath. In this case both lungs were of one uniform carbonaceous colour, which pervaded every part of their substance. The right lung was broken down in its upper and middle lobes into irregular cavities, and the walls of these cavities were black, and contained a considerable portion of a black fluid like ink. Portions of this lung were hepatized, and the rest of it, as well as the right lung, was infiltrated with a black serum. Dr. Christison analyzed the black serum (No. 109, *Edin. Med. and Surg. Journal*), and found its products similar to those arising from the distillation of coal. This case is curious, whether it be considered as an original or as a similated disease.

Prognosis.—Death is supposed to follow melanosis of the liver, and ulceration of the cutaneous or other tissue or organ.

Treatment.—No successful mode of treating this disorder is known.

Class III.—Of Morbid Poisons, and of the Diseases caused by them.—*Introduction.*

Morbid poisons are a class of substances secreted either by the patient's person, as that of typhus or of scarlet fever, or else generated by other sources, known or unknown, as that of cholera, or of intermittent fever. These poisons contaminate the healthy recipient, either in consequence of their miasmata being diffused through the atmosphere, or else by their being brought into still more direct contact with his person in his communication with the sick. The diseases they respectively engender are of a specific character, as measles, hooping-cough, or small-pox.

The diseases arising from these causes are numerous, and frequently of the most formidable description, and in the year 1839 they occasioned a mortality of 65,343, or nearly one-fifth of the whole number of deaths in England and Wales. The majority of them assume, on many occasions, an epidemic character; and history affords the most awful instances of their ravages. It is remarkable also, that many of these diseases, as the measles, hooping-cough, and small-pox, appear to have been of late formation, so that a date can be assigned to their first eruption. The cholera, also, which we have lately seen traversing Asia, Europe, America, and the northern shores of Africa, seems of this class, and is probably not of any considerable antiquity even in India, while in Europe and in America it appears to have been entirely unknown till its late appalling visitation, devastating the largest cities, and spreading over the fairest portions of the earth. Diseases consequently depending on this class of substances are most important, and merit on the part of the medical philosopher the gravest attention, both on account of their peculiar laws and complexity of phenomena, but also of their extreme intractableness and great fatality. The student can hardly be expected to understand this difficult subject, without some reference to the laws of poisons generally.

Poisons, of whatever nature, and especially medicinal substances, which are poisons when improperly applied, are subjected to certain general laws,—the most important of which are, first, that they have all certain definite and specific actions; secondly, that they all lie latent in the system a certain but varying period of time before those actions are set up; and lastly, that the phenomena resulting from their action vary in some degree, according to the dose, and to the predisposition of the patient. These laws are common to all poisons, but there are also many others which are peculiar to individual poisons or classes of poisons, and it may be necessary to notice a few of them.

The *first* law, or that of the definite and specific actions of poisons, cannot be doubted; for if it be supposed that agents acting on the human body do not produce their effects according to certain definite laws, we can neither determine the seat or course of any disease, nor direct nor judge of the operation of remedies. The definite action of causes is the basis of human knowledge, and must be equally true in medicine as in every other science. No physician, for instance, has seen castor oil produce tetanus, or colchicum intoxicate the brain, or opium inflame the spleen; he perfectly well knows that the first of these substances acts on the intestines, the second on the ligaments, and the third on the nervous system generally. The action of poisons, therefore, is not accidental, but determined by certain definite laws.

The action of poisons, though definite, is variously limited. Some poisons, for instance, act on one membrane, or on one organ, or on one system of organs; while other poisons extend their action over two or more membranes, or organs, or system of organs, or even over the whole animal frame. We have examples in aloes and jalap, of substances that act upon one membrane only, or on the mucous membrane of the alimentary canal. In digitalis we have an instance of a medicine that principally acts on one organ or the heart, greatly reducing or even stopping its action; while strychnine is an example of a medicine acting on one system of organs, or on the parts supplied by the spinal cord, producing powerful and sometimes fatal tetanic action of every voluntary muscle in the body.

It is seldom, however, that the action of poisons is limited to one membrane, or organ, or system of organs. The greater number of these noxious agents more usually act on two or more membranes, or organs, or systems of organs. Elaterium, for instance, acts on the mucous membrane of the intestinal canal and on the kidneys. Tobacco nauseates the stomach, intoxicates the brain, and affects the action of the heart. Antimony has an equally extensive range; it induces cutaneous perspiration, acts cathartically and emetically, and in large doses appears to cause gangrene of the lungs. Alcohol and opium are examples of substances acting still more generally, affecting not only the action or secretion of every organ or tissue of the body, but even in some instances altering their structure. Thus, alcohol has been shown to cause structural disease of the liver, of the stomach, and of the coats of the arteries, while opium tends to produce apoplexy and structural disorganization of the brain and its membranes. From the circumstance of these two substances acting not only generally but locally on a given number of tissues, they resemble in their effects those of many morbid poisons, as that of typhus fever, of scarlet fever, or of the small-pox.

The *second* important law of poisons is, that they lie latent in the system a period of time which varies in different individuals, before they set up their specific actions. Rhubarb, for instance, produces no immediate result, but lies dormant in the system six or eight hours before its action is sensible on the bowels; opium, in the usual dose, is generally thirty minutes before it subdues the brain to its influence. The convulsions from strychnine do not follow till twenty minutes after its exhibition, and perhaps every substance, except hydrocyanic acid, has a greater or less sensible period of latency.

When a medicine, however, acts on more parts than one, a considerable space of time may elapse after it has affected one organ before it affects another: thus digitalis frequently occasions emesis before it acts on the heart, and the action of mercury on the bowels is frequently sensible for many weeks before the gums and salivary glands are affected. The doctrine of the latency of poisons is indeed so generally admitted, that their actual period has been a point on which the condemnation or acquittal of a prisoner tried for murder has turned in our courts of justice, when corrosive sublimate or hydrocyanic acid has been supposed to have been exhibited.

The *third* great law of poisons is, that being once roused into action, their effects are modified by the dose, the temperament, or the present state of the constitution of the recipient. The effect of dose in modifying the pathological phenomena of disease may be exemplified in the actions of oxalic acid and of arsenic. The specific action of oxalic acid is to inflame the mucous membrane of the stomach; but to ensure this effect the dose must be limited so that this poison may lie in the system many hours. On the contrary, if the dose be excessive and rapidly absorbed, the poison so disorders all the functions of the three great nervous centres that life is destroyed in a few minutes, and not a trace of disease is to found in any part of the body. Arsenic likewise is a poison which inflames and ulcerates the mucous membrane of the alimentary canal, but it requires some hours to set up its specific actions, for when the dose is large it in like manner destroys by general irritation, and not a trace of morbid change of structure is to be found after death. It follows, from this law, that the larger the dose or the greater the intensity of the poison, the more rapid its action and the less the probability of finding any trace of specific disease.

In studying the effects of dose on the constitution, we find some poisons are absorbed and are *cumulative*, while others are not absorbed into the system, or else are so rapidly removed that no cumulative effect is produced. Thus, in persons predisposed to the effects of digitalis, a dose so small as to produce no sensible effect whatever, will, if frequently repeated, at last destroy the heart's action. In cases, likewise, in which it is desirable to produce vomiting at the least expense to the constitution, the means employed are cumulative, or a repetition of small doses of ipecacuanha, or other emetic substance. This cumulative property of poisons, however, is by no means universal. There is no instance of jalap or of castor oil proving cumulative, and if a frequent repetition of them produces an increased effect, it is, perhaps, in consequence of the nervous papillæ with which they are brought in contact being more easily irritated by each application, and hence they induce a more violent result.

Temperament is also a circumstance which greatly influences the action of poisons. There are a few persons altogether insensible to the action of mercury, so that no quantity will affect their gums, or increase the secretion of the salivary glands. There are others, in like manner, the action of whose heart no quantity of digitalis will control. On the contrary, there are some constitutions so morbidly susceptible of these remedies, that it is scarcely possible to exhibit even a fractional dose without giving rise to their specific effects.

Besides natural temperament, *habit*, which may be termed an artificial temperament, has a powerful influence in reconciling us to particular classes of poisons, and of making them even sources of enjoyment. Thus tobacco, alcohol, opium, are all substances which in the first instance are to many persons productive of great discomfort, but by frequent repetition they cease to have any unpleasant effects, and their stimulus at length becomes a necessary indulgence. Still there are many poisons to which no repetition can habituate us, as arsenic, corrosive sublimate, or the preparations of copper. On the contrary, each repetition only the more debilitates the constitution, and renders it more susceptible of the action of the poison.

The present state of the constitution has also a powerful influence on the action of poisons; and it would seem proved, with some exceptions, that these agents act with an intensity proportioned to the debilitated state of the patient. There is indeed no duty more imperative on the physician than that of adjusting the dose to the strength of the patient, and nothing is more common than to forbear administering a medicine because the patient's strength will not admit of it. As a general principle, therefore, medicines may be said to act with a power proportionate to the debility of the patient.

Still there are states of disease which render the constitution of the patient, though greatly debilitated, insusceptible to the action of even powerful remedies. Thus, in typhus fever, the patient will often bear a considerable quantity of vinous stimuli without being affected by it. In tetanus, or hydrophobia, no quantity of opium will tranquillize the symptoms or procure sleep. Fallopius mentions a singular instance of the constitution being armed against the action of a poison. He states, that in his day a criminal was given up to himself and other anatomists to be put to death in any manner they might think proper. To this man, therefore, they exhibited two drachms of opium, but he labouring under a quartan ague, and the fit just coming on, the "opium was hindered of its effect." The man, therefore, having survived this dose, begged that he might take a similar quantity, earnestly entreating, if he escaped, he might be pardoned. The same dose was exhibited, but it was in the interval, and the man now died.

The experiments of Majendie may be referred to as affording many curious proofs of the state of the constitution in accelerating or retarding the actions of poisons. That physiologist has shown, if a poison be introduced into the system of such potency as usually to destroy life in two minutes, on bleeding the animal the same result will follow in half a minute, or in one-fourth of the time; and this experiment has often been repeated. Majendie has also brought to light the curious fact, if, after having poisoned the animal, and even after the poison has begun to act, we inject an aqueous fluid into its veins in such quantity as to cause an artificial plethora, that as long as this artificial plethora can be maintained the action of the poison is superseded. No sooner, however, does the plethora cease, from the general effusion of water which follows into every cavity of the body, than the poison acts in the usual time, and even perhaps with more than its accustomed severity.

Mr. Hunter thought that no two poisons could *co-exist* in the same system together, or that, co-existing, they could not set up their specific actions at the same time. This hypothesis, however, is unquestionably erroneous; for we constantly see opium and digitalis, jalap and mercury, as well as many other combinations of medicines, producing their respective effects in the same system, and at the same time, by accelerating or retarding each other's actions. There is no truth better established in medicine, than that a combination of salts and senna produces a much more efficient and pleasant action than the exhibition of either remedy separately; and opium is an agent possessing a modifying or controlling power over every organ or tissue, without which it would be impossible, on many occasions, to reconcile the system to the introduction of many necessary and essential remedies. Poisons, therefore, are capable of co-existing together, and of so influencing the system that they reciprocally accelerate or retard each other's actions.

The general laws observable in the actions of medicinal substances are for the most part precisely similar to those which govern morbid poisons, or only differ in a few minor points; for these latter poisons have their specific actions and their periods of latency, while their phenomena equally vary according to the dose, or else the state of the constitution, or of the predisposition of the patient.

The specific actions of morbid poisons are distinctly proved by the fact, that we are enabled to determine, within certain limits, the course, symptoms, and pathological phenomena which result from the presence of any given morbid poison. No man, for instance, can confound the phenomena of small-pox with those of intermittent fever, or those of intermittent fever with syphilis, or those of syphilis with cholera; each of these poisons has its separate and peculiar laws, and consequently its actions are definite and specific.

The actions of morbid poisons also, like those of medicinal substances, are variously limited, some affecting only one membrane or organ, or system of organs, while others involve two or more membranes or organs, or systems of organs. Thus, tinea capitis is an example of a poison acting on one tissue of the body, and even then partially, namely, on the cutaneous tissue of the head. The waters of Switzerland contain a poison whose action is limited entirely to the thyroid gland. The contagion of hooping-cough and the virus of hydrophobia affect all the organs supplied by the eighth pair, or pneumogastric system. Instances of morbid poisons acting on two membranes or organs, or system of organs, are still more common, and form the great body of this class of disease. The poison of measles, for instance, acts no less on the mucous membrane of the eyes, nose, fauces, and perhaps on the mucous membranes generally, than on the skin. That of scarlatina acts not only on the mucous membrane of the fauces, and on the skin, but also on the serous membranes of the joints and of the abdomen. The paludal poison has a still more extensive range, hardly any organ or tissue of the body being exempt from its destructive ravages.

Morbid poisons also, like other poisons, have their period of latency; and, generally speaking, a much longer time elapses before their specific actions come into operation than takes place with medicinal substances. The virus of the natural small-pox lies dormant from sixteen to twenty days before it produces any constitutional disturbance; and a still further period elapses, of three or four days, before the specific eruption appears on the skin. The poison of scarlatina lies latent from seven to ten days after exposure to the contagion; that of the measles from ten to fourteen; while the poison of paludal fever has been known to lie dormant for a twelvemonth, and that of hydrophobia for a still longer time. These are examples of periods of latency far beyond anything that has been observed in the action of medicinal substances.

When morbid poisons act on more tissues or organs than one their actions are sometimes simultaneous, but more commonly they are consecutive, and frequently long intervals of time elapse between each successive attack. Thus, the poison of typhus fever may attack the lungs, the membranes of the brain, and the mucous membrane of the alimentary canal, and all these may be attacked contemporaneously; but it is more common that their attacks take place consecutively, or first on the alimentary canal, then on the brain, and lastly on the lungs, several days elapsing between each successive attack. In syphilis the poison acts on the part to which it is first applied—as the skin, throat, bones, and ligaments; and cases have been met with in which the throat, the skin, and the bones have been affected at the same time with the primary sore. It is more common, however, for them to occur *seriatim* and at very remote periods from the primary affection, so that many years frequently elapse before the poison has exhausted itself. In scarlatina also the peritoneum is not affected till many days after the eruption of the skin and the ulceration of the throat have altogether disappeared.

It occasionally happens that morbid poisons which usually act on a plurality of membranes, exhaust themselves on one or more without affecting the whole series. In the disease termed scarlatina simplex the poison sometimes exhausts itself entirely on the cutis without affecting either the mucous or serous membranes of the body. The rubeola sine catarrho is a similar example of the poison exhausting itself on the same tissue, the skin. In intermittent fever, when the dose of the poison is limited, and the disease properly treated, it is seldom that any organ or tissue is involved; yet, left to run its course, scarcely any organ or tissue would escape destruction.

Sometimes, when the morbid poison acts on many membranes, the usual order of attack is inverted. It is the general law of syphilis, that the bones are the last in the order of the secondary symptoms that suffer, but sometimes they are the first to be affected. In scarlet fever the affection of the skin may precede that of the throat, or the reverse may take place; and, in fever, the affection of the head may precede that of the intestines, though the latter is the most common.

It has been seen that the period of latency of medicinal substances being passed, and their actions set up, that their effects varied in a considerable degree, according to the dose, temperament, or present state of the constitution of the patient. With respect to the dose of a morbid poison, we rarely possess any direct measure of the strength of its miasmata. The paludal poison, however, of tropical climates, unquestionably greatly exceeds in intensity that of more temperate climates, and its effects are proportionally marked. Thus, in the West Indies, we have the yellow fever, with hardly a trace of organic disease after death; while, in Holland, we have a fever of less severity, but followed by enlarged livers or spleens, or else by dropsy; while, in this country, the fever is comparatively mild, and, if properly treated, for the most part terminates without any visceral affection. With respect to the influence of temperament in modifying disease, the small-pox offers very striking instances; for different persons inoculated or poisoned from the same source have suffered in every varying degree from this formidable malady, or from the horn, the distinct, the confluent, and the bloody small-pox; while, in the worst cases, the child has died in the primary fever, and before the specific action on the skin has been induced. It may, therefore, be laid down as a general law, that the more intense the dose of the morbid poison the more severe the form of disease; and also that fewer traces of organic alteration will be found after death than when the poison, or the disorder it produces, has been of a milder character. Thus, enlarged livers, disorganized spleens, and dropsy marked every case that died of the Walcheren fever, while in the West India and African fevers, though resulting from the same poison, scarcely a trace of disease is to be found.

The present state of the constitution also influences the event. Thus, persons of a good constitution, but ignorant of their danger, are often seen to pass through a mild form of typhus fever, while the nurses and others contaminated at the same source, but more alive to their critical state, have sunk without a struggle. As a general principle, therefore, it may be stated, that morbid poisons act with an intensity proportioned to the enfeebled or depressed state of the constitution; but this law is not universal. The hardy mountaineer is a surer victim, whether he visits the low countries of the tropics or the marshes of a more temperate climate, than the feebler native of those countries. The immunity the latter enjoys is probably owing to his habit of living in the noxious atmosphere; for let him remove to a more healthy climate, and then return to those regions of pestilence, and he will be found as susceptible of the poison as the hardiest stranger.

Another law of morbid poisons is, that two may *coexist* in the same system; thus, scald-head and fever, measles and scarlatina, have often been seen at the same time in the same person. In this case the respective diseases sometimes appear simultaneously, and each runs its course unaffected by the presence of the other; but the more usual law of febrile poisons perhaps is, that when two co-exist, the one lies latent while the other runs its course, or they interrupt each other's progress, the active one becoming latent while the latent one becomes active, and occasionally they modify each other's actions. A case of intermittent fever was admitted into St. Thomas's Hospital which was not controlled in the usual time by medicine; suddenly, however, it subsided, and the small-pox appeared. The small-pox having run its course, and the patient being recovered from that disorder, the intermittent fever returned, and now readily yielded to quinine. A child, having been exposed to the infection of the small-pox, was vaccinated; in a few days, however, the small-pox appeared, and ran a very mild and modified course. When the small-pox had entirely subsided some action was seen in the punctured part of the vaccinated arm, and the cow-pox vesicle formed, but not till three or four weeks after the time it usually appears, and then exceedingly small.

The principal points in which the laws of morbid poisons agree with those of poisons generally having been stated, it will now be necessary to state those circumstances in which they principally differ. Many medicinal poisons have the property of accumulating in the system, and acting with an intensity proportioned, not to the last dose, but to the aggregate of the whole quantity that has been administered. Thus the last few minims of digitalis may stop the action of the heart, or the last few grains of mercury salivate the patient. There is, however, no well-authenticated fact which can be arranged under this law in the whole circle of morbid poisons. A given quantity of a morbid poison is perhaps necessary to produce a given disease, but below that point the miasmata perhaps circulate without injurious effect. The actual quantity, according to the experiments of Dr. Fordyce, is perhaps extremely small; for that physician, in hopes of mitigating the small-pox, inoculated with virus greatly diluted. The disease was not always produced, but, when produced, it assumed every form, character, and degree of severity, according to the temperament or constitution of the patient.

Another peculiar law of morbid poisons, and one wholly unknown to medicinal substances, is the faculty which the human body possesses of generating to an immense extent a poison of the same nature as that by which the disease was originally produced. A quantity of small-pox matter not so big as a pin's head will produce many thousand pustules, each containing fifty times as much pestilent matter as was originally inserted; and moreover, the blood and all the secretions of the body are supposed to be also equally infected with the matter of the pustules. The miasmata secreted by one child labouring under hooping-cough are sufficient to infect a whole city.

Perhaps there is a still more remarkable law of morbid poisons, and unknown to those of a different class, which is, that many of them possess the extraordinary property of exhausting the constitution of all susceptibility to a second action of the same poison. This is the case with scarlatina, measles, the small-pox, the hooping-cough, and indeed with a considerable class of disease. Still it would seem that a temporary protective influence was imparted by most morbid poisons, for it is certain that few persons suffer a second attack of the same epidemic disease; and, consequently, it follows that the previous action of the poison must for a time impair the susceptibility of the constitution to its attacks. This beneficent law is of great importance in social life; it enables those that have recovered to attend on those that are sick, and allows a mother fearlessly to nurse her child in a dangerous and contagious distemper she has herself passed through.

It only remains to mention one other law, which is but little shared by poisons of the vegetable or mineral kingdoms. It is well known that the actions of vegetable or mineral poisons are not influenced by the climate in which they are administered. Climate, however, has the property of greatly modifying the intensity of morbid poisons. The severe forms of typhus so common in the north latitudes are hardly known in more southern latitudes, and the cholera has been infinitely more fatal in Europe and in America than in the country which gave it origin; but besides influencing the intensity of the disease, climate or season, or both, greatly modifying the specific nature of morbid poisons. In one season, for instance, typhus fever will attack only the glandular structure of the intestinal canal; in another only the mucous tissue of the same part, the glands or follicles being healthy; while, in another season, no disease whatever of the intestinal canal can be traced. Again, in one paludal district the liver will be inflamed and the spleen healthy, and in another the liver will be unaffected but the spleen disorganized. In both cases the genuine character of the disease remains the same, but its specific character varies. It will have been seen that this variety of pathological phenomena is also caused by peculiarity of idiosyncrasy, and that nothing can be more different than the distinct, the confluent, and the horn small-pox from each other; and yet all these different varieties may exist in different persons inoculated with the same poison. The character of the vaccine pustule is equally various; so that that which ensures exemption from the small-pox has not yet been determined; neither have pathologists determined the primary forms of syphilitic ulcers. It is important, therefore, to remember, in the study of morbid poisons, that absolute uniformity of pathological phenomena is not to be expected in different persons and in different seasons. There is a limit, however, within which their variations oscillate, and within which nature has bounded her deviations.

The laws of poisons are more important than their *modus operandi;* but this part of the subject has been deeply investigated by modern physiologists, and deserves some consideration. The great and striking alterations which often take place in the blood, led from a very remote period to the doctrine of humoralism, or that a morbid state of the fluids was the great and primary cause of disease. On the contrary, when anatomy began to be cultivated, and nerves traced into every organ and tissue, it was supposed that disordered actions of these prime agents of motion, and of the great phenomena of animal life, were the great causes of disease, the morbid state of the fluids being secondary. Fontana determined to prove this latter theory, and found, to his surprise, on laying bare the sciatic nerve in a great number of rabbits, that neither the venom of the viper nor the poison of the ticunas, nor hydrocyanic acid, when applied to it, produced the phenomena of poisoning, and that no other consequence resulted beyond what would have been produced by a similar mechanical injury.

Fontana having shown that the phenomena of poisoning do not result from the application of the deleterious agent to the trunk of the nerve or to the *solids*, determined to ascertain whether they followed after absorption, and consequently contamination of the *fluids*. He therefore injected the venom of the viper, hydrocyanic acid, or other poisonous substances directly into the veins of different animals; and he found that, although the nerves of a part may be steeped in these poisons with impunity, yet no sooner did the substance enter the veins, than the animal, after uttering a few horrible shrieks, struggled and almost instantly died, and thus demonstrated a morbid state of the fluids as well as the existence of a tissue of extreme sensibility, and with which the poison being brought into contact, accounted for the death of the animal. Fontana pursued this subject one step further, and showed if poisons acted by absorption, that this absorption was in many instances extremely rapid. He submitted a number of pigeons to be bitten in the leg by the viper, and chopped the wounded limb off at different intervals after the introduction of the venom, and found, as the result of an extensive series of experiments on several dozens of pigeons, that none recovered when the poisoned leg was removed at a later period than 25 seconds, though the phenomena of poisoning did not occur till several minutes later.

The experiments of Fontana had shown, supposing a poison to be introduced into the veins, that all the phenomena of poisoning were accounted for; but still it might be said that the fact of absorption was something wanting of strict demonstration; and for the further prosecution of this subject we are indebted to Segalas, who showed, if the arteries and veins of the mensentery of a dog be tied, that a quick acting poison would lie in harmless contact with the corresponding portion of the intestine for many hours; but no sooner were these ligatures removed than poisoning took place in a few minutes. Majendie even has carried this proof of the veins absorbing still further, for he amputated the leg of a dog, having first introduced a portion of quill into the femoral artery and vein, in such a manner that, on dividing these vessels, the leg hung connected with the trunk solely by means of the quill, all continuity by means of the solids being cut off. The poison was now introduced into the paw, and in four minutes the animal was under its influence.

By these experiments, it is apprehended that Fontana, Segalas, and Majendie have completely demonstrated the absorption of poisons by the veins, and consequently of their circulating with the blood; and that no doubt may remain on the subject, modern chemistry has demonstrated the actual presence of many medicinal substances either in the blood itself, or else in the secretions from it. Thus after a treatment by soda, large quantities of uncombined alkali have been found in the serum. Alcohol has been obtained by distillation from the blood; while iodine, rhubarb, the nitrate of potash, and a large number of other substances taken into the stomach, have been found in the urine. It follows, then, that poisons are absorbed and mingled with the blood, and are conveyed directly to the parts on which they act, passing with impunity over others for which they have no affinity.

The fact of morbid poisons in like manner being absorbed, and mingling with the blood, has been shown by many continental writers; but perhaps the experiment made by Professor Coleman is the most satisfactory. "I have produced the disease (the glanders) by first removing the healthy blood from an ass, until the animal was nearly exhausted, and then transfusing from a glandered horse blood from the carotid artery into the jugular vein. The glanders in the ass was rapid in its progress, violent in degree, and from this animal I afterwards produced both glanders and farcy." Both scarlatina and measles have also been produced by inoculation from the blood of patients labouring under those diseases.

The circumstance of the presence of a poison in the blood is supposed by Andral to produce, besides its toxicological states, certain alterations in its physical condition. Thus he conceives a specific cause has a tendency to destroy or reduce the quantity of fibrine in the blood, which he has found in some instances to be only one part in a thousand. Hence he adds, whatever may be the nature of the pyrexia, the blood, whether it be taken from a vein or collected from the heart and arteries after death, always exhibits the following characters—namely, that the serum and clot are incompletely separated the one from the other, so that the clot is consequently large, and often appears to fill almost entirely the bleeding-basin. Its edges also are never raised, and its consistence is inconsiderable, so that it is easily torn, broken down, and reduced to a state of diffluence, and in this state it becomes grumous, and discolours the serum. It is also remarkable for the absence of all buff, which is rarely met with in typhus, in measles, in scarlatina, or in small-pox, unless there has been some inflammatory complication; and even when it does exist, as in confluent small-pox, with large collections of pus, the buff is soft and gelatinous, and, by expression of the serum, is easily reduced to a thin pellicle. This defect of fibrine he conceives to be the cause of the great tendency to hæmorrhage, and to that stasis or congestion so remarkable in typhus, scarlatina, and other diseases dependent on morbid poisons.

The facts and arguments which have been adduced, have, it is apprehended, distinctly proved that morbid poisons act in all instances not capriciously, but according to certain definite and specific laws, modified by the influence of climate, temperament, or the magnitude of the dose; also, that they mingle with the blood, with which they continue in latent combination a certain but varying period of time; and likewise that many of them are capable of co-existing together in the same system. Two other remarkable laws result from the study of morbid poisons,—or that these singular agents are not acted upon by medicinal substances as long as they continue latent: and again, that when they act on more tissues than one, the remedy which is an antidote to its action on one is often absolutely powerless when it affects another tissue; so that many different remedies are frequently necessary to combat the varying phenomena of the same disease. A knowledge of these laws is necessary for understanding this class of disease, and it is hoped that by their application many of the difficulties which have hitherto obscured the doctrines of fever, of syphilis, of hydrophobia, and of many other diseases incident to the class of morbid poisons, may be removed, and that this portion of medical science may be placed on a surer foundation, if not on a permanent basis.

Of the Typhoid Poison.

Typhus fever is the only continued fever of this country; it runs an indefinite course, has no intermissions, is of great fatality, and is both infectious and contagious. The number of persons reported to have died of this disease in England and Wales, in the year 1839, was 15,666.

It is uncertain whether the ancients were acquainted with this fever,—at least none of their descriptions correspond to it. The first authentic accounts of it are to be found in the early British chronicles, and they describe it as spreading in our courts of justice, and giving rise to what have been termed "the black assizes." The last black assizes happened at the sessions of the Old Bailey in 1756, when the lord mayor, two of the judges, and several eminent and other persons died infected, as was supposed, by the prisoners. This fever has had many popular appellations—as the jail fever, hospital fever, ship fever, putrid fever, brain fever, bilious fever. We are indebted, however, to Pringle and to Fordyce for having shown that these supposed different fevers are identically the same, and have no such essential differences as constitute them distinct genera. The phenomena of typhus indeed vary in some degree in different years, and in different persons in the same year, but not to a greater degree than those of small-pox or of scarlet fever. While the British physicians were employed in generalizing this fever, and in determining many of its laws, the French physicians, and especially Serres, and Petit, and Louis have the great merit of having perfected its pathology.

Remote Cause.—Typhus fever prevails not only in Great Britain but likewise over a great part of the north of Europe, and also of North America. Indeed its range may be said to be limited to the space between the 60° and 40° of north latitude, for it is little known to the south of the Mediterranean and towards the equator. The poison appears, therefore, to have a local origin, but the mode of its generation has hitherto eluded the penetrating search of all those who have hitherto attempted the investigation of this difficult branch of medicine.

The decomposition of vegetable matters is found to give rise to paludal, or to the class of intermittent fevers, and consequently the causes of typhus fever have been sought for in the decomposition of animal matter. A large body of facts, however, prove that this hypothesis cannot be true; for Dr. Bancroft has shown that the classes of persons most employed about animal matters, as butchers, curriers, sugar-bakers, knackers, and others, are remarkably exempt from fevers. It has been next thought that the decomposition of the human body generated this virulent poison; but many thousand bodies have been dug up, with a view of levelling churchyards, both in this country and in France; they have been re-coffined and re-interred, and this at all seasons of the year, but without the persons employed being in any degree affected with fever. The experience also afforded in our anatomical theatres shows that dead animal matter does not cause fever; Dessault used to affirm, from the general exemption of his pupils, that the old proverb "morte la bête mort le venin" was proved; and Lallemand and Dubois adopted the same maxim. Ribes, whose class amounted from 120 to 160 pupils annually; and Serres, after witnessing the effects of dissection on an aggregate number of 9600 pupils, both assert they never remarked any disease existing among their pupils which could be attributed to the emanations incident to the dissecting room. Dupuytren, Dumeril, Jadelot, Breschet, Andral, and Parent du Châtelet, all bear similar testimony, and some even assert the greater exemption of the pupils of the dissecting-room to be remarkable compared with those frequenting the wards of the hospitals. The hypothesis, therefore, of the poison of typhus fever emanating from the putrefaction of dead animal matter does not at present appear to be satisfactorily supported, although the depressing effects of miasmata thus generated probably greatly predispose to the disease.

The impossibility of assigning any definite origin to the typhoid poison has led to the inference that it may have a telluric source, and be evolved according to laws not yet understood. The grounds for this opinion are, that although typhus fever is endemic and sporadic at every season of the year, yet that it is occasionally greatly epidemic, and at irregular periods, varying it is supposed from four to sixteen years. When epidemic, it continues to prevail to a great extent for two or three years, and has its commencement, its point of culmination, and its period of decline in each year. Another argument for this hypothesis is, that it appears little influenced by season, prevailing to nearly an equal extent in winter, spring, summer, and autumn, so that the poison must be extricated under conditions little influenced by temperature. At all times, also, it follows the law of most poisons supposed to emanate from the earth, or that it most affects low countries, the banks of rivers and canals, although in epidemic seasons it prevails equally on the mountain as on the plain. Its greater prevalence, particularly in crowded districts of cities, in addition to their being generally low and ill drained, may be accounted for by the fact of the contagious nature of the disease. Supposing this poison then to have a telluric origin, it is probable, from the disease being unknown in tropical climates, that it must be volatilized, destroyed, or decomposed, at a not very high temperature. From its pathological phenomena, moreover, varying in different seasons, and in different epidemics, it is evident the poison undergoes certain modifications from some unknown combination of causes.

Predisposing Causes.—There are few diseases where the predisposing causes so greatly influence the reception of the poison as typhus; for although this surprising and appalling malady occasionally attacks the wealthy, yet it is admitted to be the disease of the *poor*, and not of the *rich*. Dr. Baillie stated, that in his extensive private practice he had scarcely met with an instance of typhus fever, and this in seasons when the *poor* were falling in large numbers. The physical condition, the many privations, and the mental sorrows of poverty are among the most powerful predisposing causes of typhus; and when, in addition to these, bad draining, defective ventilation, bad supplies of water, increased filth, and overcrowding are present, the mortality is often frightful. This statement cannot be better illustrated than by adding, that the average number of deaths in the gentry living at Bath, is 1 in 55, while in the *cellar* population of Liverpool the average age of death for the whole town is 17 to 18 years only. In every large city the great spread of fever is limited to its worst localities, as Whitechapel, the low districts along the banks of the Thames, the courts about Holborn, and the crowded population of St. Giles's. Famine enhances all these accidents; and though not the cause of fever, yet greatly prepares the system to receive the fatal germ of this pestilence. In Ireland, from the year 1721 to 1728, there was scarcely a case of fever; but after the latter year three bad harvests occurred in succession, and provisions rose to an extravagant price, and now fever broke out and continued to be epidemic till 1732. The year 1739 was also one of great scarcity, and fever again broke out and continued to prevail with such virulence, that in 1741, 80,000 persons are estimated to have died in Ireland from this cause alone. In the year 1800 there was a similar scarcity, and a similar prevalence of fever; and again in the year 1816, not only a year of famine, but of great commercial distress, fever again raged to a most distressing extent not only in this country but even in a great part of Europe. In the present year, 1843, fever is said to prevail in Glasgow to such a degree that the number of burials exceeds that of the most fatal years of cholera, the condition of the pauper being a penny a day allowed by the parish.

Armies on actual service are exposed for a time to almost all the severest privations of civil life, together with the addition of great fatigue; and the history of every campaign in Europe has shown that no sooner has the army entered into winter quarters, than with hardly an exception fever of a most destructive nature has broken out among the troops, spreading along their communications, and devastating long lines of country.

The extent indeed to which fevers prevail in armies cannot be better shown than by stating the report made to Napoleon after the termination of the campaign of 1807, by the peace of Tilsit, of the numbers of the troops admitted into hospital, by which it appears there were—

Of Fevers	210,000
Killed and wounded . . .	100,000
Venereal	62,000
Miscellaneous	48,000*

Again, in the campaign of Moscow, fever even more than the sword hung upon the traces of the retreating army, and thinned the ranks as fatally as the snows of Russia. Of this fever Kutusoff died, at his head-quarters at Bunzlau, after having delivered Russia in the extremity of its peril, and achieved the overthrow of the mightiest armament of which history has preserved a record. This fever spread its ravages for the next four years through every kingdom in Europe.

The influence of other predisposing causes is much less marked: sex does not appear to affect the liability, except perhaps from women being more exposed as attendants on the sick. Thus, in Glasgow in 1836, of 2260 cases 49·5 per cent. were males, and 50·15 per cent. females. In Edinburgh in 1819, of nearly 16,000 patients, 57 per cent. were females, and 43 per cent. males.

All ages are liable to typhus, but the extremes of life have a trifling exemption. Thus, Dr. Cowan found in the epidemic in 1836, that at Glasgow the proportion of deaths according to age was as follows:—

Ages .	5 to 10	10 to 15	15 to 20	30 to 40	40 to 50	50 to 60	60
Population . .	25,707	21,211	20,745	26,419	18,014	11,640	10,220
Fevers . . .	191	318	501	309	128	43	11
	1 in 134	1 in 66	1 in 41	1 in 85	1 in 140	1 in 270	1 in 920

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* Alison's History, vol. vi., p. 308.

Season has some but not great influence over this affection; for out of 51·944 cases of fever admitted into the different hospitals of Great Britain and Ireland, the total number in January was 2895, February 2825, March 3152, April 3374, May 3990, June 4365, July 4999, August 5621, September 5046, October 5624, November 5054, and in December 5359. The disease therefore appears to be more frequent in summer and autumn than in winter and in the spring, in the ratio of 3 to 5. The effects of a town life, compared with a country life, in predisposing to typhus, is not determined. In the years 1838 and 1839, the numbers per cent. of the population that died of typhus in the metropolis were ·219 and ·296; while in England and Wales the proportion for the same years was ·125, and ·101.

The poison, however fostered or generated, yet having once produced the disease, establishes a new source of infection in the patient's person, which now secretes a poison which is both contagious and infectious.

Infectious.—The proof of the infectious nature of the typhoid poison is, that in hospitals we often see patients labouring under other diseases, as soon as a case of fever comes into the ward, shortly afterwards fall ill of that fever, although they have not left their beds, or in any way approached the infected person; and this occurs when other persons in the same building, and in every respect similarly circumstanced, except living in the same ward with the fever patient, escape.

The distance to which the miasmata may extend around the patient's person so as to communicate the disease is not accurately determined. Experience, however, has shown that in a large well-ventilated ward a space of three feet around the patient's person so dilutes the poison that the disease rarely spreads. When, however, three, four, or more fever cases are collected in the same ward, nobody in that ward is safe, and patients the most remote from the diseased person will take the disease. It is under these circumstances that the students, nurses, and hospital attendants of every kind constantly fall from fever in large numbers.

Contagious.—The argument for the contagious nature of this disease is, that it has been observed that the gentlemen employed to bleed, and the nurses employed to exhibit enemata to the fever patients, have been the parties who have at all times been seized in the largest proportion with typhus, the danger increasing according to the degree of personal contact: the most striking proof, however, of its contagious nature is its spread by

Fomites.—The communication of the disease by fomites has been proved by the laundresses at the fever-houses, and who have no immediate intercourse with the patients, falling ill in unusual numbers. The persons also employed to take care of the clothes of the soldiers sent to the Hospital Salpêtrière, labouring under fever, in the disastrous campaign of 1814, fell ill of that disease. Another satisfactory proof of the contagious nature of fomites, is the endless succession of persons seized with fever in the lodging-houses for the poor throughout the country, caused by the miasmata, as is supposed, adhering to the walls and furniture of the room.

Mode of Absorption.—The typhoid poison, being diffusible through the atmosphere, must be introduced into the system by means of the mucous membranes, and being also contagious it seems probable it must be absorbed by the skin.

Period of Latency.—The typhoid poison, being absorbed into the system, infects the blood. This was proved by Mr. John Hunter, who injected into the veins of a bitch half-gone with pup a quantity of serum taken from a person ill of fever, and who soon after died. The animal turned instantaneously sick, vomited, and soon miscarried, but in two or three days recovered. Gendrin injected an ounce of blood drawn from a person labouring under fever, into the cellular membrane of the groin of a cat. The animal vomited, and died in seven hours. As these accidents would not have happened with healthy blood, it may be inferred that the poison infects the blood, and circulates with that fluid in a latent state, for a period which varies greatly in different individuals. Some persons have sickened immediately on entering the chamber of a person ill of fever, and others have vomited on examining the fæcal matter he has passed; but in general the period is much longer, and its extremes may be stated at from two days to two months—the more usual period being from two to three weeks.

Co-exists.—It is not unusual to witness the combination of typhus and syphilis; of typhus and erysipelas; of typhus and the itch, in the same person. Typhus, therefore, may co-exist with many other affections depending on morbid poisons.

Pathology.—The theory of this disease is, that the typhoid poison having been absorbed and mingled with the blood, lies latent a certain period, after which it primarily induces certain derangements of function of the great nervous centres, as the brain, the cord, and great sympathetic, and consequently of the organs they supply. These derangements constitute the phenomena of fever, and are—alterations of temperature—changes in the force and frequency of the pulse—disorder of the alimentary canal—headache, and other concomitant affections. In severe cases the fever thus established has destroyed the patient in a few days, without leaving a trace of inflammation or other organic disease in any part of the body. More generally, however, after the fever has lasted a given time, as a few hours, or a very few days, certain secondary actions or "*specific inflammations*" are set up in a limited number of the organs or tissues of the body,—as inflammation of some portion of the mucous membrane of the alimentary canal; 2ndly, inflammation of the brain, or its membranes; 3rdly, certain cutaneous eruptions; and lastly, inflammation of the bronchial membrane, or else of the substance of the lungs. The poison, however, does not necessarily run through all this series, but often exhausts itself on one or more of the above-mentioned tissues. Thus, in one year the lungs will be attacked in every case; in others, the membranes of the brain; and in others, the alimentary canal; while in other years such attacks will be rare, and the exception and not the rule of the disease. The order, also, in which the organic lesions are set up varies much in different years. Sometimes the membrane of the brain will be first affected—at others, the tissues of the alimentary canal; and at others, the substance or other part of the lungs. Such irregularities are common to all morbid poisons, and many years must elapse before the relative frequency and order of their occurrences can be determined, and this intricate problem of pathology unravelled.

The popular nature of this treatise and our very limited space will not allow us to enter very minutely into the pathology of fever; but when the typhoid poison produces inflammation of the mucous membrane of the alimentary canal, its seat may be either the web of the membrane, or its connecting cellular tissue, although commonly both are affected, or else its follicular structure.

The law which determines this election of the poison is not understood; but it is ascertained that in many years the follicles are the parts principally affected, while in others they are with few exceptions healthy. Thus, from 1813 to 1832, scarcely a case of fever was examined in which the follicles of the alimentary canal were not found ulcerated or otherwise greatly diseased. In 1832, however, when the cholera appeared, the follicular structure almost ceased to be affected, and the web of the mucous membrane was more generally inflamed; again, in the years 1837–8, though the follicles and web of the membrane were occasionally seen affected, yet for the most part not a vestige of the inflammation of any part of the mucous membrane of the alimentary canal was observed. When the inflammation attacks the web of the membrane, that inflammation may be either the diffuse, the serous, or the ulcerative; and in all these instances the colour of the inflamed part is of a deep venous red, almost approaching to blackness. When the follicular structure is inflamed it is liable to the serous, the adhesive, or the ulcerative inflammation. In the one case the gland is enlarged and transparent, in the other hard and granular, whilst in the last the ulcer may take a variety of forms. Indeed, the tendency of every inflammation of the alimentary canal is to ulcerate, and the number of ulcers is various, or sometimes only one; sometimes several, even to affecting every patch of Peyer's glands, while in the stomach they are sometimes so numerous that that organ appears to be riddled. It occasionally happens that some one of these ulcers burrows so deeply that it ruptures the peritoneum, and the patient dies of peritonitis. The parts of the alimentary canal usually attacked are the cæcum or ileocæcal valve, the inflammation extending upwards and downwards, often for several inches. In a few instances the colon or small intestines are the exclusive seat of the disease, and in still rarer instances the stomach; but it frequently happens that the inflammation is seated in two or more of these parts. Again, when the adherent surface of the mucous membrane of the alimentary canal is the seat of the disease, the inflammation is either the diffuse or suppurative. When the former, the connecting cellular tissue is rendered more easily lacerable than in health, and consequently considerable portions of the mucous membrane can readily be detached by the handle of the scalpel. In the latter case, a number of small abscesses form like so many pock, which at length rupture into the intestinal canal. In general, when the intestines are inflamed or ulcerated, the mesenteric glands corresponding to the diseased part are enlarged and evidently inflamed, but whether from sympathy or from a specific action of the poison is not determined.

The parts next to the intestinal canal, which are the most important as well as the most frequent seat of the action of the typhoid poison, are the brain and its membranes. Diseased function of the brain, as delirium, exists in five cases out of six in typhus; but delirium of the most marked character is often unattended with any trace of inflammation, either in the membrane or of the brain itself. Dr. Tweedie states, that he examined fifty-four cases that died with well-marked symptoms of cerebral affection, yet in fourteen cases no trace of disease in the brain or its membranes could be found. When the brain is affected it is generally found to be abounding with more points of blood than usual; a state of parts supposed to be diffuse inflammation of that organ. Some small portions at its surface, also, are sometimes softened, or achromatously inflamed; but in other respects the brain is healthy. The membranes of the brain are much more frequently diseased than its substance, and are the more specific seat of the poison in fever; they are liable to all the degrees of inflammation to which they are at any time subjected, as the diffuse, the serous, the adhesive, and the purulent. The serous inflammation, however, is the most common, and the quantity of fluid effused varies from a drachm to an ounce or more, and this is generally mixed with points of lymph or pus.

The organs next in order of attack are the lungs; and the frequency with which they are attacked varies greatly in different seasons. Some seasons will pass with scarcely a single case of this tertiary action of the typhoid poison, while in other seasons every case of fever will show more or less affection of the lungs. The bronchial membrane and the substance of the lungs are the parts affected; but the former is most frequently attacked, and is the seat of the serous or of the purulent inflammation. When the substance of the lungs is inflamed, that structure is liable to the diffuse and serous inflammations, and also to the red and grey hepatization; but of these the serous inflammation is the most common, and it is not unfrequent to see flow from the lungs, as they are removed from the body after being cut into, a sero-sanguineous fluid, as abundantly as from a large sponge.

The cutaneous tissue is more constantly affected in typhus than the lungs, but its affections are of less moment. These affections also greatly vary in frequency in different seasons; for in some years they equal 70 per cent., while in other years their occurrence is only occasional and accidental. These affections are petechiæ and sudamina. The former consist of a number of small round spots, like flea-bites, of a dull roan colour, slightly salient, and from half a line to two lines in diameter. Their more common seat is the chest, the abdomen, and more rarely the thighs, arms, face, and back. This eruption does not appear on all parts it attacks simultaneously; neither does it appear to follow any given order of succession. It consists of many different crops, whose duration is not always the same; for in some cases they will disappear after two or three days, while in others they will last twelve or fifteen days. Chomel is of opinion that the same part may be affected by a succession of crops, each dying away at the end of three or four days.

The sudamina are small hemispherical vesicles, or transparent bladders, from a quarter of a line to a line in diameter, formed in the cutis, and so transparent that when we look at these little bladders obliquely their appearance is most brilliant. Regarded, however, in a direction perpendicular to their axis, they are so diminutive as frequently to escape observation. Still they are always sensible to the touch, and if presssed they rupture, and the finger is moistened by the fluid they contain. This fluid, perfectly transparent when the vesicle is first formed, Chomel affirms, becomes opaque after a few days, and no longer fills the vesicle, which shrivels, and at length desquamates. This eruption is often seen in the first instance on the sides of the neck—in the axillæ—in the groin, and in many cases it is limited to these spots. In other cases, however, it covers the whole trunk, and in others the whole body. This eruption appears later in the disease than the petechiæ, and most frequently about the middle or end of the second stage of the fever.

Ulceration of the nates and back sometimes takes place towards the end of this fever, but appears to result rather from the debility of the patient and his supine posture than from any specific action of the poison.

Symptoms.—The varying intensity of typhus fever has induced pathologists to divide this disease into typhus mitior and typhus gravior. This division is founded in nature; but it seems proper also to add a subdivision founded on the different affections of the cutaneous tissue, and the arrangement of its varieties will then be as follows:—

Typhus mitior - - - -	Typhus gravior.
Typhus mitior petechialis -	Typhus gravior petechialis.
Typhus mitior sudaminalis	Typhus gravior sudaminalis.

The structural lesions of other organs or tissues than the skin afford no data for a further generalization, because the lesions are so frequently similated by mere functional derangements, or else masked by local insensibility, that perpetual error would arise from the adoption of new species founded on them.

According to Chomel, out of one hundred and twelve cases of typhus fever, in seventy-three cases the invasion was sudden, while in thirty-nine it was preceded by headache, pains in the back, nausea or vomiting, constipation or diarrhœa, together with slight rigors followed by heat, and terminating either with or without sweats. When these symptoms exist, they usually last two or three days, some increasing and others disappearing, till at length those which are more particularly characteristic of typhus are established.

Typhus fever is compounded of primary fever, and of such symptoms as the organic lesions may give rise to. The phenomena of fever are supposed more particularly to consist in shivering, heat, sweating, and in an increased frequency of the pulse; but though these may be all present, yet each and all of them may be wanting. Rigors, for instance, are often absent; the temperature of the body may be lower than natural; the sweat is at all times accidental, and the pulse in a few cases is preternaturally slow. The phenomena of typhus fever, therefore, must be sought for in other than the group of symptoms that have been mentioned.

The most remarkable symptom of the typhoid poison is the extreme degree of prostration, both of the physical and intellectual powers of life, which it produces. This is so great that there are few patients who are not compelled to take to their beds on the first or second day of the attack; for they cannot take a step without staggering or falling, nor sit up unless supported; and even when in bed are hardly able to change their position, or assist themselves in any manner. The functions of the brain are equally depressed, and somnolence in a greater or less degree is almost universal; so that the patient is aroused with difficulty, and relapses on ceasing to be questioned. In this state their memory, though ordinarily correct, is slow; their minds, though not perverted, are incapable of all intellectual exertion, and they lie indifferent to all around them, and even to their own situation. The effects of the poison, of course, vary greatly in degree; but although delirium is often active in the first instance, yet the group of symptoms which has been described is by far the most common.

This depressed state of the powers of life has often proved fatal to the patient in the first few days; but these are exceptions, and more commonly the disease runs its course, and is divided into three stages, each stage being known by the state of the tongue, which is in the first stage white, in the second brown or black, and in the third, in the event of the patient's recovery, it again becomes white, and at length natural. These states of the tongue do not indicate any given organic or functional lesion, either of the brain or alimentary canal; for it is equally white, or covered with sordes, whether those parts be or be not inflamed. They consequently merely mark the degree in which the system labours under the action of the poison. These different stages, however, are generally accompanied by certain states of the vascular system. In the first stage, then, or as long as the tongue is white, the pulse is generally full and strong, and seldom exceeds 90 to 110; in the second or brown-tongue stage, the pulse is small, and is frequently increased to 120 or 130; and in the third stage, it either gradually returns to its natural standard, or else becomes almost countless—a mere vibration, and in this state the patient's case is generally hopeless. The duration of these stages is very various, and even some one or more of them may be wanting; but in a twenty-one days' fever each stage may last a week, but more frequently they are of unequal length, and the disease much longer.

The symptoms of typhus, it has been stated, are compounded of those of the general depression and of those which result from the accompanying functional lesions of the alimentary canal, the brain, the lungs, or of the skin.

With respect to the alimentary canal, *Diarrhœa* is the law in fever, and prevails in a great majority of cases. Most patients, for example, are purged from the very first day of the attack, in a greater or less degree; and many, unless it be checked by medicine, pass eight or ten stools, or more, in the twenty-four hours. The nature of the dejections is peculiar, and, in the great majority of cases, they are darker in colour than in health, and when the follicles are diseased contain large flakes of thickened mucus, which, floating about and deeply tinged with bile, appear like small portions of the variegated moss that grows on the tiles of houses. Frequently the stools are grumous, and, according to Louis, assume the character of coffee-grounds; while in a few cases blood is passed, and sometimes in amazing quantities, filling the chamber-vessel.

Another symptom is *meteorism*, or the effusion of air into the large intestine. This is present in a greater or less degree in one-half of the cases, and when considerable it always marks a grave affection, and one generally fatal. On the contrary, the abdominal muscles are in a few cases tense, and strongly contracted.

The above symptoms are present whether the alimentary canal be or be not inflamed; but when inflamed, as a general rule the patient experiences no pain, or only when strong pressure is made. The seat of the pain, whatever part of the alimentary canal be affected, is either immediately over the ilio-cæcal valve, or else over the epigastric region. In a very few instances the intestine ruptures, and the patient dies in great agony from peritonitis.

It is seldom, however, that the fever runs its course without greater complexity both of symptoms and of lesion ; for the brain, or the membranes of the brain, or both, most commonly become either simultaneously or consecutively affected with the alimentary canal. In these cases the symptoms which arise from their condition will be added to those already described ; but it has been stated they are often present when the function of these parts is merely disordered, as well as when they are inflamed.

Inflammation of the membranes of the brain may be divided into three stages, though some one of them is often wanting. The symptoms of the first stage are severe and constant pain in the head, occupying ordinarily the frontal region ; the face, sometimes pale and sometimes red, being greatly expressive of the distress the patient suffers. The eye, haggard or brilliant, with its conjunctiva injected, is painfully sensible to the light, and is, therefore, generally closed. The least noise is insupportable, and the patient is troubled with noise in his ears. His temper also is altered, and his answers short and fretful. This stage, then, is that of increased excitement, but not as yet of delirium, and, supposing the membranes to be inflamed, denotes diffuse inflammation of those tissues. At the end of a period of time, varying from two to ten days, this stage terminates, and the second stage is ushered in by the patient becoming delirious. His delirium may assume every character, and be joyous or melancholy, furious or tranquil ; and in some cases he wanders from subject to subject, while in others he incessantly recurs to the same theme, and even to the same few words. In others, though the cases are few, the disease assumes every character of insanity ; and, if permitted, the patient confined in a strait waistcoat presents the extraordinary spectacle of being able, in typhus fever, to walk about the wards. The phenomena of this stage show that the inflammation of the membranes of the brain has extended to the substance of the brain itself. The last stage, or that of effusion, commences by the active delirium changing into a low muttering, by the patient no longer requiring restraint, by his muscles becoming spasmodically affected with slight twitchings, or subsultus tendinum, showing how rapidly the nervous power is exhausted, and how feebly supplied ; also by the pupil of the eye becoming expanded or contracted ; by the fæces being passed involuntarily ; by the urine being retained ; and by the rapid grouping of those other symptoms so happily described by Shakespeare, as the stone coldness of the feet creeping " upward and upward," " the babble of green fields," and the " fumbling of the bed-clothes," and which indicate approaching death. When the patient recovers, however, from this stage, the appetite improves, the pulse becomes fuller and steadier, the countenance more tranquil, the mind firmer, his sleep natural, till at last convalescence is fully established.

If, in the course of the disease, the poison falls on the lungs, the symptoms denoting inflammation of these organs will necessarily be added to those of the brain and of the alimentary canal, though these latter have generally much abated at the time of this occurrence. If the inflammation be confined to the mucous membrane, the symptoms are a short dry cough, with a mucous or purulent expectoration, and perhaps mixed with blood. Should the substance of the lungs be affected, crepitation, or a loud mucous rattle, is heard all over the chest, while the countenance becomes livid and swollen, and the breathing loud and laborious,—symptoms which sufficiently denote the nature of the lesion the lungs have sustained.

With respect to the cutaneous tissue, it is sometimes dry, but more commonly the patient is covered with perspiration, which gives no relief. It should be added, that on the eruption of petechiæ or of sudamina, the disorder appears to be neither aggravated or ameliorated. The sudamina, however, in general mark a milder fever than the petechiæ.

Diagnosis.—The nature of this fever cannot be determined during the few first days of the attack ; for the fever which precedes the eruption of small-pox, of a common cold, and of many other disorders, in no respect differs from that of the first stage of typhus. If, however, the fever continues unabated at the end of four or five days, and with no eruption or other circumstance to account for it, there can be no doubt the disease in question is typhus.

Prognosis.—The prognosis to be formed of typhus varies greatly according to the circumstances in which the patient is placed, and to the severity of the type. Desgenettes says, of 25,000 men who reached Torgau after the disastrous campaign of 1813, 13,448 perished of typhus in four months. At Mayence, says M. Fauverge, of 60,000 troops, 25,000, or $\frac{5}{12}$ths, died of typhus. In France, it is estimated that from one in three to one in four and a half is the proportion of deaths to attacks. In this country, it is calculated that only one falls in six or seven of those attacked. In some years, however, when the fever is mild, the recoveries are much larger ; while in years in which the type of the fever is low, the ratio is much smaller. Age has a great influence over recovery. Dr. Arthur Thomson affirms that the risk of life in fever is twice as great at 31 as at eleven years old ; twice as great at 41 as at 21 ; and five times as great at 61 as at 11 years. The following table, however, from Mr. Watts's inquiry into the mortality from fever, in the great towns in Scotland, is a nearer approximation to the solution of this problem, or—

There died per cent. of those attacked in the towns of	Under 10 Years of Age.	From 10 to 12.	Above 12.
Edinburgh . .	12 per cent.	29	70
Glasgow . .	12 ,,	29	70
Perth . . .	15 ,,	30	69
Dundee . .	19 ,,	51	48

Women are supposed to have more chances of recovery than males.

Treatment.—As typhus depends on the system being impregnated with a poison for which no antidote is at present discovered, the fever, whatever be the mode of treatment adopted, uniformly runs its course, modified only by the treatment, the season, and by the temperament of the patient.

The antidote to the poison of typhus, if it exists in nature, being undiscovered, what is the best mode of treating this formidable disease ? In typhus fever there is almost uniformly present in the first stage a full pulse, an increase perhaps of temperature, considerable headache, inflammation of one or more organs or tissues, and the blood when drawn in the first stage is occasionally buffed. Ought we, under these circumstances, to bleed ? To this practice, however, the experience of Huxham, Pringle, Lind, Carmichael, Smyth, Fordyce, and even of the celebrated Mr. John Hunter, is decidedly opposed ; for they affirm that, although in mild cases of fever some blood may be taken with impunity, still it rarely benefits the patient, while in severe cases its injurious effects are strongly marked. In modern times, Andral has bled in fever, but with so little success that out of 74 cases thus treated 35 died. Louis has also repeated this experiment; and he says that of 52 cases that died of fever, 39 were bled a greater or less number of times; and that the course of the disease was more rapid and fatal in proportion as the first bleeding was large and practised at the earliest period of the disease. He also adds, that the delirium was aggravated rather than relieved, and that it caused no sensible alleviation of the abdominal affection—results certainly anything but favourable. Cruveilhier also states that typhus ought not to be treated after the manner of diseases essentially inflammatory. Such is the evidence against bleeding in fever, and demonstrating that operation to be the exception and not the rule of treatment in this formidable disorder—a deduction which is perfectly in accordance with all we know of morbid poisons—it being proved by repeated experiment that when an animal is poisoned, the poison is more rapid in its course, and more fatal in its consequences, in proportion to the degree the animal has been bled.

We should therefore never forget, in the treatment of this disease, that it has a course to run; and secondly, that in most cases there is a series of local inflammations to be set up, as in cases of scarlet fever, measles, or small-pox,—inflammations which no art can prevent, and which, when moderate, render the disease both milder and safer than when such inflammations are altogether wanting; and also, that the general as well as specific actions of the poison are, for the most part, greatly increased by large bleedings, or by severe and unnecessary depletion of any kind. The utmost, perhaps, that can be said for bleeding, is, that in mild cases it may sometimes be practised with impunity.

With respect to the few positive rules in the treatment of fever, experience has shown that they vary, in some degree, according to the nature of the affections of the alimentary canal. When, for instance, the follicular structure of the intestines is inflamed or ulcerated, it seems proved by a large number of cases that a local treatment by enemata composed of decoct. hordei lb. ſs. to lb. j. c. syr. papaveris, ℥ ſs. to ℥ j. is by far the most successful treatment. These exhibited night and morning remove all those causes which can irritate the inflamed part, and thus soothe and tranquillize the system generally. In addition to this, if the abdomen should become meteorized, a large linseed poultice should be applied over the abdomen and kept on for many hours. In this form of the disease no advantage appears to have been derived from the application of leeches or blisters to the abdomen or temples. Neither has wine in large quantities been useful.

When the web of the mucous membrane is affected, or the membranes of the brain, or both, and the disease is of moderate intensity, the old method of treatment is probably to be preferred, or to give salines as long as the tongue is white, and perhaps to apply a few leeches to the temples if the eye be injected; and as soon as the tongue becomes brown, to support the patient by means of mist. camphoræ, ℥ iſs. c. sp. ætheris nitrici, ʒ j. 6^{tis} vel 4^{tis} horis, and at the same time to allow him four to six ounces of port wine with sago, strong broths, &c., daily. If meteorism should take place the linseed poultice should be applied as in the former instance.

Should the disease, however, be decidedly of a low character and bleeding out of the question, and the lungs loaded, a powerful stimulant treatment is perhaps to be preferred from the very commencement of the disease. Thus, ten grains of camphor dissolved in two ounces of gin, and given night and morning, whatever were the symptoms, was successful in many of these doubtful cases. Some, also, were treated with salicinæ, gr. v. 4^{tis}, and recovered; while, in the worst cases, ʒ j. of quinine thrown up as an injection every night often produced good effects. The linseed poultice, also, was applied with much advantage when meteorism was present.

Another practical rule in the treatment of fever is, that when the parotid glands are enlarged, the patient must be supported from the very commencement with wine, æther, broths, &c.—at least when the patient has been differently treated he has died.

In all instances the patient is benefited by checking those secretions which are in excess and restoring those which are in defect. Such are the most general rules for the treatment of typhus fever.

Dietetic and Preventative Treatment.—The patient's diet should be strictly farinaceous, with the addition of broths and subacid fruits throughout the whole course of the disease, or until the nates, as they sometimes do, slough, and in that case a mutton chop must perhaps be prematurely hazarded; but its effects should be watched with much caution.

The preventative treatment includes the three great principles of *cleanliness*, of *ventilation*, and of *separation*. The chlorides or boiling vinegar may mask or destroy smells, but do not neutralize or destroy contagion; for when the Hôpitale Salpêtrière at Paris was used for fever patients, in the campaign of 1813, even those who superintended the fumigations fell ill of the disease. Cleanliness, such as frequent change of linen and the removal of all evacuations, are not only grateful to the patient, but, by preventing an accumulation of miasmata, are a safeguard to the attendants. Ventilation has likewise the same good results; and in every case of fever the bed curtains should be undrawn and the door or window occasionally opened for the admission of air. Cleanliness and ventilation also should not be limited to the person of the patient but should extend also to the apartment; and, on his recovering, the chamber in which he has lain should be well washed, and such parts as will admit of it be white-washed. It is owing, perhaps, to the neglect of this precaution that fever so fatally prevails in the lodging-houses of the poor. One family falls ill of fever, and another succeeds, which suffers the same fate, till the walls become impregnated with the miasmata and the apartment becomes a real focus of infection. Even where the party has a permanent habitation, but ill ventilated and dirty, the same result follows: thus, the Rookery of St. Giles's, the Mint in the Borough, and the narrow courts of Holborn and Whitechapel are hardly ever quite free from fever. In every epidemic, therefore, it is the duty of the parish authorities to see that the houses of the poorer quarters be cleansed and white-washed. Separation, however, is as necessary as ventilation and cleanliness; for when fever cases are heaped together fever of a most dangerous character prevails; and even our largest hospitals become, under these circumstances, a focus of pestilence and contagion.

OF THE POISON OF SCARLATINA.

There are three diseases usually termed the *exanthemata*, in consequence of their principal phenomena being a very marked eruption—namely, the scarlet fever, the measles, and the small-pox. They are re markable for being the first diseases of secondary formation we are acquainted with, being supposed to have first originated in Arabia about the middle of the VIth Century. The Arabians first described them, and considered them merely as varieties of one and the same disorder. Many essential differences, however, were soon observed to distinguish the small-pox; but the points of resemblance between measles and scarlet fever were so many, that it was not until many most fatal accidents had occurred from the great error of confounding them, that their differential characters were remarked and their separate identity established. There is one remarkable law, however, common to them all, or that the patient having once had either of these diseases is not again liable to it, his susceptibility to the poison being exhausted on the first attack. We now mean to treat of scarlet fever, a disease from which there died in 1839, in England and Wales, 10,325 persons.

Remote Cause.—The original source of the poison is distinctly traceable to Arabia; but as that country is greatly destitute of animal and vegetable matters, it seems impossible to refer its origin to any chemical decomposition of those substances. As the disease has now spread over the whole world, as it prevails at all seasons of the year, is always sporadic, and yet often epidemic, the more probable inference is that it must have a telluric origin.

Predisposing Causes.—Scarlet fever has been found to spread more extensively and with greater fatality among the poorer than among the wealthier classes of society. It is twice as fatal in towns as in the country; for in 1838 the mortality in the metropolis was 0·82 per cent., while in England and Wales it was only 0·39 per cent. Again, in 1839 it was 1·131 per cent. in the metropolis, and as 0·67 in England and Wales. Its prevalence also appears to be influenced by season,—at least if we suppose the deaths to be proportioned to the numbers attacked. Thus, in the winter quarter of 1839 there died in the metropolis 207, in the spring quarter 272, in the summer quarter 408, and in the autumnal quarter 637. Both sexes are attacked in nearly equal proportions; or in 1839 5·095 males died, and 5·230 females. All ages are probably liable to the action of this poison, but it is most common to childhood, the feebleness of this early period of life facilitating perhaps the reception of the poison.

It is a law of this disease that, once produced, the infected person of the patient generates a poison which is both contagious and infectious:

Infectious, because no susceptible person can remain in the same room, and hardly in the same house, without contracting it. The

Infecting distance is consequently much greater than in typhus. Indeed it is necessary to break up every academic establishment in which it prevails, it being hardly possible to isolate children in the same house or school, however large, so as to prevent it spreading. It is likewise

Contagious; for children have been inoculated with the serum found in the vesicles which sometimes accompany the rash, and have taken the disease; but the inoculated disease not having proved milder than in the natural way, this mode has been abandoned. Another proof of the contagious nature of scarlatina is, that it has often been propagated by

Fomites, as by the clothes and boxes of boys returning from school. Susceptible persons also sleeping in a room lately occupied by patients labouring under scarlatina, and before the furniture has been washed and the bedding and walls well ventilated, have often taken the disease.

Susceptibility exhausted.—Dr. Willan says, that out of 2000 cases that he attended, he witnessed no instance of a *second attack*. Still there are some exceptions to this law—Dr. Binns having seen instances of scarlet fever occurring twice in the same party, while Sir Gilbert Blane met with an instance of its occurring thrice in a young lady, without the least suspicion of ambiguity or possibility of mistake.

Co-exists.—Scarlet fever has often co-existed with the vaccine disease and with erysipelas, and this poison is consequently capable of co-existing in the system, not only with those that have been mentioned, but probably with all other morbid poisons.

Modes of absorption.—This poison is absorbed by the mucous membranes, and also evidently from the fact of inoculation by the skin. Children have been born labouring under this affection, and consequently the poison infects the blood.

Period of Latency.—This period varies from a few hours to ten days. In one case inoculated by Rostan, the disease appeared on the seventh day. The disease is probably contagious and infectious as soon as the primary fever has formed, and perhaps till the sore throat has perfectly healed, supposing that affection to continue after the eruption has died away.

Pathology.—The theory of this disease is, that the poison having been absorbed, mingled with the blood, and its period of latency completed, acts upon the great nervous centres, deranging their functions, and producing fever. This fever, termed the primary fever, having lasted 24, 48, or 72 hours, does not subside, but the secondary actions of the poison are set up as the peculiar eruption followed, preceded, or accompanied by a sore throat. The eruption runs a given course of six to eight days, but the duration of the affection of the throat is more indefinite, and varies from eight to twenty, or more days. The fever continues during the eruption, and as long as the sore throat exists, but these being terminated, it now subsides, and the disease is ended. In a few instances, however, tertiary actions succeed, as dropsy or inflammation of the joints, diseases quite as formidable as any which had preceded them. As in ordinary fever, the poison of scarlet fever acts on the brain and its membranes, often causing the usual forms of inflammation of those parts.

The law that fever precedes the specific actions of the skin is so general that it has few exceptions, and the pyrexia has been occasionally so severe as to destroy the patient before the more specific actions of the poison have been set up. Again, the law that the great specific action of the poison is on the skin, causing the eruption or exanthema, has likewise only a very few exceptions. Of this eruption there are three kinds, termed by Frank, scarlatina levigata sive plana; scarlatina milliformis sive papulosa; and scarlatina pustulosa sive phlyctænosa vel vesicularis. These are all evanescent after death, the capillary action of the part continuing after the apparent decease of the party.

The scarlatina levigata is a smooth eruption, in which the surface of the inflamed skin presents no inequality either to the sight or touch. The scarlatina papulosa is when the papillæ of the skin are enlarged, and the appearance is that of roughness, or of "goose-skinned." The third form is when the eruption is accompanied by a number of vesicles filled with serum, which ultimately shrivel up and desquamate.

Whatever the form of the eruption, its first appearance is that of innumerable small bright red puncta or maculæ, separated by interstices of healthy skin. These puncta or maculæ quickly become confluent, so that in a few hours the redness becomes general over the parts attacked. The colour, in ordinary cases, is in the first instance a bright red, like that of a boiled lobster, but on the decline of the disease it becomes deeper, and more resembles that of beet-root, while in severe cases it is livid and intermixed with petechiæ. But whatever tint the eruption may assume, it has this peculiarity, that it disappears on pressure, and again returns from the periphery to the centre on that pressure being removed. The colour is also always brighter and more vivid in the flexure of the joints and about the hips and loins than over the rest of the body. The termination of this inflammation is generally by desquamation, and occasionally the squamæ are so large as to preserve entire the whole epidermis of the palms of the hands and of the soles of the feet. Frank has even seen them come away with the hair, nails, and even verrucæ attached. In a few instances, however, the termination is by ulceration.

Whatever be the colour or description of the eruption, it does not attack all parts of the body simultaneously, but appears partially or in a succession of crops; or on the first day it spreads universally over the face, neck, and upper extremities; on the following day over the trunk, but is less general on the back than on the abdomen; and, lastly, on the third day it has extended itself over the lower extremities. The duration of each crop is about three days, when it disappears, and in the order of attack, fading from the head and upper extremities on the fourth day; from the trunk on the fifth day; and from the lower extremities from the sixth to the eighth day. The order of attack, however, which has been mentioned is not constant, for in some few instances the eruption appears first on the trunk and lower extremities, and only on the second day very faintly on the face and upper extremities.

The poison as frequently falls on the mucous membranes of the eyes and nasal fossæ as on the skin, and excites a similar eruption over those parts; at first consisting of a similar distinct punctuated or dotted appearance, which changes in a few hours to one diffuse red. The inflammation of the ocular membrane, however, has this peculiarity, that it does not distress the sight, for the eye bears light without inconvenience, and in no case is it suffused with coryza. Neither is sneezing a consequence of the affection of the nasal membrane; and only in a few severe cases is there any discharge from the nostril. As the eruption attacking these parts generally appears with, so does it generally die away with, the first crop of the exanthemata of the skin. This inflammation usually terminates by resolution; but in a few instances the alæ of the nose ulcerate, and sometimes mortify.

The lingual and buccal mucous membranes are also often the seat of a similar exanthema, presenting nearly the same appearance as in other parts. The papillæ of the tongue, however, are singularly elongated and enlarged, and stand up salient and erect, and of a deep scarlet colour above the thick white mucus which coats the lingual membrane, and hence the term "strawberry tongue." This affection lasts longer than the former, and usually terminates by resolution, though in a few instances the buccal membrane ulcerates and mortifies.

The sore throat, or inflammation of the faucial membrane, though not so constant an affection as that of the skin, yet, when it does exist, is often of much longer duration, and is a much graver disease, and it may either precede all the other symptoms, or else occur at any period of the fever. This inflammation, at first punctuated, then diffuse, usually runs into ulceration; and the character of the ulcer is so completely in unison with the state of the constitution as to enable us, according as it is slight or severe, to divide scarlatina into two great varieties, or into scarlatina mitior and into scarlatina gravior. The first, or sthenic form, is marked by a greatly enlarged or swollen state of the tonsils, which are of a vivid or bright red colour; and, when ulceration takes place, the ulcers are seldom deep, or the sloughs slow to come away, but usually separate about the fifth or sixth day, so that in mild cases the sore throat is healed about the eighth or tenth day, or in more severe ones about the fifteenth or twentieth. In malignant cases, or in scarlatina gravior, the tonsil is much less tumefied and enlarged, but is much more loaded with blood, and is of a deeper and sometimes of a livid colour. The ulcers also are deep and formidable, and the sloughs are thrown off later in the disease. They are likewise slow to heal, or not till the end of three weeks, or in severe cases not till four or even six weeks have elapsed, during which period the fever continues and the patient lies in considerable danger.

The inflammation of the throat may extend to all the neighbouring parts, and an abscess may form in the pharynx, or pus issue from the ears; the tympanum has been eroded, and in a few instances the inflammation has extended to the larynx, and the patient has died of croup. Besides these disorders the glands of the neck often enlarge and occasionally suppurate, and, singular to say, sometimes not till after the sore throat has healed, and sometimes when there has been no previous affection of the throat, as if these parts were the seat of a specific action of the poison.

The inflammation of the cutis, as also of the buccal mucous membrane, is usually accompanied by some inflammation of the sub-cellular tissue. This affection takes place as soon as the rash appears, and causes the hands to swell, so that the patient is unable to bend his fingers, and his face also becomes tumefied and painful. The serum effused, however, is in mild cases absorbed, and the disease terminates without any unpleasant consequence. In severe cases, however, it has a tendency to terminate in ulceration or in mortification. In one child the toes of the right foot had sloughed off; in another the integuments of the leg mortified from the knee to the foot; while, in a third, mortification commenced in the upper lip, and spread till one-half the cheek was eaten away. Some have been known to die of mortification of the rectum, and others of a similar affection of the pudenda.

Such are the primary and secondary affections of scarlatina; but this poison has also some tertiary actions, as on the cellular tissue, causing dropsy, and on the synovial membranes of the joints.

The dropsy which sometimes occurs after scarlet fever must be considered as a tertiary action of the poison. This usually commences between the fifteenth and twenty-third day of the disease, and almost uniformly not till after all the other symptoms have subsided. It begins with anasarca of the face, afterwards attacking the hands and feet. In some instances the anasarca is universal, the whole cellular tissue filling so rapidly as sometimes to destroy the patient in a few hours, the cavities of the chest and abdomen frequently filling at the same time. When the patient has fallen from this dropsy the kidneys have in general been found healthy, although albuminous urine has been secreted during life.

The inflammation of the synovial membranes has been described by Withering, Sennertus, Heberden, Murray, and others. This disease may attack the wrist, ankle, or knee-joints, and usually terminates by effusion of serum; but in two cases that died at the London Fever Hospital the joints contained pus. This inflammation seldoms occurs till after the eruption has subsided, and is therefore the result of a tertiary action of the poison.

Such are the morbid appearances which have been observed in scarlatina, and with sufficient constancy to be attributed to a specific action of the poison; but these appearances are only to be found when the disease is of moderate intensity and the patient survives some days, for in severe and rapid cases the patient dies, not from any organic lesion, but from the intensity of the poison,—for Bretoneau, Tweedie, and Sims all speak of having examined the bodies of persons who have fallen early in the disease, in which there was scarcely any appreciable lesion. Besides these lesions peculiar to the action of the poison of scarlatina, must be added those inflammatory appearances of the brain and its membranes which are common to fever generally.

Symptoms.—The varieties of scarlet fever arise out of the law, that poisons may exhaust themselves on one or more tissues they affect without involving the whole series. Thus, the poison of scarlet fever usually acts on two membranes, or on the skin and mucous membrane of the fauces; but its actions may be limited either to one or the other of these membranes. Assuming, then, that the term scarlatina should be applied to the most usual form of the disease, or to the affection of the two membranes, the classification of the varieties would be thus—

Scarlatina,
Scarlatina sine eruptione,
Scarlatina sine angina.

Scarlatina also may be either mild or severe, and hence we have the gradations of—

Scarlatina mitior, and
Scarlatina gravior.

Scarlet fever, of whatever description, essentially consists of fever and certain local inflammations; but among the more striking phenomena of this disease, as in typhus fever, is the sudden and remarkable depression of the moral and physical powers of the body which the poison produces,—a depression so great as sometimes to cause the death of the patient in a few hours, without any re-action or any very sensible local lesion of the throat or other part being discoverable after death. On the contrary, there are a few instances in which the re-action is so great as to destroy the patient in an equally short time, and with a similar absence of all pathological phenomena, the affection of the skin being suppressed, the sore throat wanting, and the patient falling as from an overwhelming poison.

The symptoms of scarlet fever under ordinary circumstances may be divided into three stages. The first stage occupies the period from the commencement of the disease till the appearance of the eruption, and is technically termed the "*primary fever.*" The second stage, that from the appearance of the eruption till its entire subsidence; while the third stage is reckoned from the disappearance of the eruption till the termination of the disease. The duration of the first stage is twenty-four, forty-eight, or seventy-two hours; that of the second from six to eight days; while the third stage may either not exist, or vary from a few hours to two or three weeks, making the whole duration of the fever to vary from eight to thirty or more days. These stages are not, as in typhus, usually marked by changes of the tongue, for, except in scarlatina gravior, it continues coated with a white mucus throughout the whole course of the disease. In scarlatina gravior, however, it becomes brown or black in the second or at the commencement of the third stage.

The primary fever may be sudden in its attack, or the patient may complain for some days of slight indisposition. Its symptoms, whatever be the variety, are those of the first stage of typhus,—as headache, pains in the back and loins, loss of appetite, sickness, and white tongue. Still there are symptoms which distinguish it from ordinary continued fever, for the pulse, instead of being full and strong, is small and weak, and rapid, and the heat of the skin more ardent, and these phenomena continue through the whole course of the disease. The fever varies, however, greatly in intensity, or from a mere febricula to the severest forms of typhus.

Scarlatina sine angina is the simplest form of scarlet fever, and is limited to the fever and eruption, without any affection of the throat.

The symptoms of this variety are extremely mild, so that the patient is frequently not confined to his bed. The primary fever, except that the pulse is rapid, is little more than a mere febricula, and is not aggravated on the appearance of the eruption. The eruption appears at the end of twenty-four or forty-eight hours, and the crops follow each other according to the usual order of succession, appearing first on the face and neck and upper extremities; on the following day on the trunk; and on the third day on the lower extremities, when the disease has reached its acmé. On the fourth day the rash begins to decline, and fades from the face, neck, and upper extremities; on the fifth day it disappears from the trunk; and on the sixth or seventh day it is evanescent over the whole body. The colour of the rash is always more florid during the night than in the day, and on its declining desquamation takes place. With the disappearance of the rash the fever of this variety ceases, and the disease terminates; but it often leaves the patient in a state of considerable debility for several days.

Scarlatina sine eruptione.—In this form of the disease also the specific action of the poison is limited to one tissue, or that of the throat, the eruption on the skin being altogether wanting.

There is seldom a season in which scarlatina has been in any degree epidemic, that cases have not occurred in which patients not having previously had the scarlet fever are seized with severe fever and sore throat, unaccompanied by any eruption, and who, on subsequent exposure to the contagion of scarlatina, have been found insusceptible of the action of the poison; and hence it is inferred the disease they have passed through, must have been a variety of scarlet fever or scarlatina sine eruptione.

This disease therefore essentially consists in fever and sore throat. It has been stated that the state of the throat was constantly in unison with the state of the constitution, and consequently this form of disease, according to its severity, assumes all the symptoms which accompany scarlatina mitior or scarlatina gravior, with the exception of the absence of the eruption. It seems unnecessary therefore to give a separate detailed account of this variety.

Scarlatina Mitior.—The essential character of this variety is, that the secondary or specific actions of this poison fall on two tissues, or on the skin and on the mucous membrane of the eyes, nose, mouth, and fauces. This form is liable also to the tertiary actions of the poison, but in what proportions have not as yet been determined. It is distinguished from scarlatina gravior by the more enlarged and hardened state of the tonsils.

The fever which precedes the eruption in scarlatina mitior lasts from 24 to 72 hours. The symptoms, however, are more violent than in the preceding species; for nausea or vomiting, great restlessness, headache, and some delirium frequently occur as early as the second day. The heat of the skin also is more considerable, and often raises the thermometer as high as 105°, while the pulse is quick, feeble, and fluttering, and shows the extreme debility the poison has occasioned. The primary fever having lasted its period, the specific actions of the poison are set up, and the eruption runs the course which has been described in scarlatina sine angina, but its colour is more intense, its duration more variable, and its attack more partial.

The *angina*, so marked a symptom in this affection, may precede the primary fever, may commence with the eruption, or may occur at some later day in the disease. It has many grades, and in this form of scarlatina they are all sthenic. Thus, in slight cases the throat has merely the sensation of roughness, with some pain in deglutition; at a higher degree the tonsil is enlarged and ulcerated; while in cases of still greater severity they are swollen to a degree almost to occlude the fauces. In this latter case the act of deglutition is not merely painful, but in many instances impossible, and impeded by a thick viscid mucus, which frequently requires the effort of vomiting to remove. The irritation of the fauces is sometimes propagated to the larynx, and the patient is hoarse or inaudible, and perhaps ultimately falls from this new affection.. The parotid and submaxillary glands also often enlarge, sometimes previously to the sore throat, more commonly about the fifth day, and again after the sore throat has healed. In a case recently treated at St. Thomas's Hospital, these glands, singular to say, began to enlarge about the 14th day, without the patient having had any antecedent or accompanying sore throat, as though this affection was the result of a specific action of the poison.

The degree of fever is usually proportioned to the severity of the angina, and is accompanied by headache and sometimes by delirium. It does not abate on the appearance of the eruption, but continues till the throat is healed. If the sloughs come away early, or on the fourth or fifth day, the throat heals, and the fever perhaps subsides within a day or two after the eruption. It sometimes happens, however, that the sloughs do not separate till the fourteenth or fifteenth day; and in this case the fever runs on with equal violence after the disappearance of the eruption, and the whole disease is sometimes prolonged for three weeks or a month. In this case the tongue may become brown or dry, but it seldom continues so for more than a few hours.

Scarlatina Gravior.—The specific actions of the poison in this form of the disease are the same as in scarlatina mitior, but the symptoms, both local and general, are more severe, and the tertiary affections more frequent, and consequently the disease is more grave and the danger more formidable.

The more remarkable symptom which distinguishes this form of the disease is the state of the tonsils. In the scarlatina mitior it has been stated that the tonsils are either slightly affected or greatly enlarged, of a bright red, and the ulcers comparatively superficial; but in this severer form the tonsil, though less swollen, is more gorged with blood, more livid in colour, while the ulcers are foul, deep, and burrowing; the secretions of the mouth also are more copious, and generally impregnated with the offensive sordes of the sloughs; while deglutition, if less difficult, is perhaps infinitely more painful, and the mouth often so tender that the slightest touch excoriates it. The ulcers likewise are slow to granulate, and only heal after a fearful struggle; and in the worst cases they spread in every direction, and the parts vesicate and mortify previous to the death of the patient.

The eruption also offers some peculiarities, being often later, by some hours, in coming out, its colour darker and more livid, its duration more uncertain, and its distribution more irregular and capricious than in scarlatina mitior. The primary fever likewise is usually longer, the delirium earlier, and the depression more complete than in the milder forms, and towards the close of the disease the tongue becomes brown, and the symptoms closely resemble those of the last stage of typhus fever.

Such are the more marked characters of scarlatina gravior; but it often happens that the progress of this disease is silent, slow, insidious, scarcely marked by any prominent symptom, till the degree in which the constitution is subdued by this formidable poison is shown by the inflamed nasal membrane discharging its fatal ichor, causing mortification of the alæ of the nose, or else mortification of the lip or cheek, or else it seizes on some remote part, as the toe, the leg, or the whole of a lower extremity, and which for the most part terminates the life of the patient.

The tertiary actions of the poison of scarlatina are inflammation of the joints and dropsy, and it is singular that these diseases are more often set up after mild than after the more severe forms of this fever. In a few cases, then, about the time of the disappearance of the rash, the joints of the wrist or fingers, of the knees or other articulation, become swollen and inflamed, and present all the phenomena of an attack of acute rheumatism. This affection keeps up the fever and prolongs the whole duration of the disease for many days beyond the usual period.

Again, in a given number of cases, not exceeding three per cent. in general, but in different seasons, or under different treatment, sometimes amounting to twenty per cent., the tertiary action of the poison produces dropsy. This disease usually occurs about the twenty-second or twenty-third day, or about the time when the patient is convalescent, and more often after a mild than after a severe disease, Dr. Wells never having seen it follow "the putrid sore throat." This affection more commonly begins with œdema of the face, then the hands and feet swell, and, in a few cases, the trunk and lower extremities become enormously distended, and the patient presents a frightful appearance. When the cellular tissue is thus slightly or more generally distended with fluid, effusion may take place into the cavities of the head, chest, or abdomen. When the brain is threatened, the effusion is commonly preceded by the usual hydrocephalic headache, by convulsions, and sometimes by blindness. Effusion into the cavity of the chest or of the abdomen causes the usual symptoms of hydrothorax and of ascites, which have been described, and need not be repeated. In the former instance, however, the water is sometimes poured out so rapidly as to destroy the patient in a few minutes or in a few hours.

The first appearance of the œdema, whatever form of dropsy may follow, is usually preceded or accompanied by an accelerated pulse, by the urine being scanty, commonly turbid, and passed with pain; the quantity, however, is shortly increased; and if examined when passed copiously, it is found to be of low specific gravity, or from 1·011 to 1·017, and to contain albumen.

Diagnosis.—The only diseases with which scarlatina can be confounded are the acute forms of roseola and measles. Roseola, though usually accompanied by fever and sore throat, yet is distinguished from scarlatina by the eruption being confined generally to the chest. The diagnosis between measles and scarlatina will be better understood after the laws of measles have been described, and will therefore be best treated of in the diagnosis of *measles*.

Prognosis.—The mortality from scarlet fever varies greatly according to the season, and also perhaps according to the *treatment*. In some years the proportion of deaths is not greater than three per cent.; but Sir Gilbert Blane says his practice gave one in four; but he probably was consulted only in the worst cases, for in the same year it appears, from the reports of other practitioners, the deaths varied from one in six to about one in thirty, according, perhaps, to their different modes of treatment.

Treatment.—Scarlet fever being evidently accompanied by many highly inflammatory symptoms, the practice of bleeding was adopted on the first breaking out of the disease in all countries, and, according to Willan, with the most disastrous results. The practice of bleeding was adopted by Morton; and he speaks of witnessing 300 deaths from scarlatina in a week. It prevailed also down to the times of Huxham, who abandoned it and introduced a treatment by bark. In this manner an entirely opposite system of treatment has been introduced, and the records of medicine enable us to state the results of these opposite modes of treatment:

		Died.
Of 121	cases treated at the Foundling Hospital by bleeding, in 1786	19
60	cases treated at the London Fever Hospital in 1829, in the same manner	10
181		29
or 1 in 6 nearly.		
200	treated by wine, mineral acids, &c.	2
160	ditto by purgatives and emetics	16
50	ditto ditto	3
45	ditto ditto	1
100	wine and mineral acids	3
555		25
or nearly as 1 in 22.		

It seems therefore proved, that one in six has died after bleeding, while only one in twenty-two has died after a milder, if not a directly opposite, mode of treatment; and the conclusion which inevitably follows is, that the chances of recovery are diminished by the practice of bleeding nearly in the ratio of four to one as compared with the chances of recovery, supposing the patient not to have been bled. It remains now to give some general directions for the treatment, and to point out the circumstances in which bleeding, purgatives, wine, and tonics may be most advantageously employed.

It should be laid down as a maxim, that in scarlatina medical advice ought always to be had recourse to; for the worst cases we meet with, as mortification of the nose, cheek, or limb, are those in which the disease has, from its apparently mild character, been left to itself.

In the scarlatina sine angina, the mildest form of the disease, it is often sufficient to confine the patient to the house; to strictly enjoin a milk diet; to regulate the bowels; and, above all things, to avoid the nimia diligentia medicorum. If anything more be done, a small quantity of wine and water, proportioned to the age of the patient, is the best. The disease thus treated is uniformly mild, and when the rash declines the fever subsides, and the disease is at an end.

The treatment of the scarlatina sine eruptione is the same as that of the two following varieties, or that of the scarlatina mitior and the scarlatina gravior.

The treatment of scarlatina mitior, or when the tonsils are considerably enlarged, is first to tranquillize the stomach and allay its inverted action when vomiting exists, either by small doses of the sulphate of magnesia or by the effervescing draught,—medicines which, according to the state of the bowels, may be exhibited every four or every six hours. As soon as this object is effected, and it is ascertained that the tonsils are greatly enlarged and swollen, the practice, supposing the patient to be an adult, is to relieve them by a local bleeding, and twelve to fifteen leeches should be applied to the throat, and allowed to draw freely, and this bleeding may be further encouraged by the application of a poultice. The trifling loss of blood thus sustained does not impair the general strength of the patient, while it greatly reduces the swelling of the tonsils and prevents their becoming permanently enlarged. Another advantage is also gained by the application of leeches to the throat, namely, that they relieve the affection of the head; for we constantly, in diseases depending on morbid poisons, often relieve the head by relieving the part specifically acted upon.

The tonsils having been relieved, the fever may now be permitted to run its course little influenced by medicine, and the patient only refreshed by the occasional exhibition of the saline draught so grateful to his parched mouth and feverish state. For in these cases if we stimulate the patient, we only bring back the tumefaction of the tonsils; while, on the contrary, if we take more blood we hazard producing the more serious accidents incident to scarlatina gravior. The medicines, therefore, that have been mentioned should be persevered in till the disappearance of the eruption, and till the healthy granulations of the throat and the decline of the fever give the certain evidence of a state of convalescence. At this point perhaps some mild tonic medicine, as the infusi aurantii c. tinct. aurantii, is desirable, and prepares the patient once more for the fullest enjoyment of health. This is the most successful treatment of scarlatina mitior.

The scarlatina gravior is characterized by the less swollen state of the tonsils; by their being more livid and gorged with blood; by the ulcers being deeper and more spreading; and by the slough being fouler than in the former variety. In this form, as there is a greater tendency of parts to run into mortification, the necessity of adopting a more stimulating plan of treatment, and one more calculated to support the powers of the constitution, is manifest, and experience has shown this view of the case to be correct. A treatment by wine, which is much more easily digested than most medicines, therefore should be the basis of the cure. The quantity of wine for an adult is from four to six ounces in the twenty-four hours, and for the child about half that quantity. The wine may be either port or sherry, and should be drank in small quantity, mixed with two-thirds water; or it may be given with sago, arrow-root, or other slop. The earlier the wine is given in the disease the better, and when delirium does or does not exist, or whether the tongue is moist and white, or brown and dry, and it should be continued till the patient is decidedly convalescent, and even for some time after. While pursuing this plan it is necessary that the patient's bowels should be attended to. This treatment by wine is extremely successful; and, as it is in general pleasant to the patient, whether a child or an adult, it is seldom refused. Most persons, however, are fond of medicine, and have great faith in it; and in these cases an equivalent may be substituted, as the disulphate of quina, gr. j. to gr. ij. 6^{tis} horis, or the infusi aurantii c. tinct. aurantii, ʒ iſs. 6^{tis}, or salicinæ, gr. v. 6^{tis} vel 4^{tis}. The decoctum cinchonæ c. acidi sulphurici dilut. ♏v. to x. 6^{tis} horis, is also another efficient remedy.

In cases where, from the state of the throat, it is difficult to decide whether the treatment by wine or by leeches should be adopted, the former is always preferable; for, in case of error, it is easy to detract blood, but we cannot with the same certainty give the patient power.

The treatment of the tertiary affections of the poison is very various. Thus the affection of the larynx is one of the most important; and it is singular that although this affection would seem to be of an inflammatory character, yet bleeding is not successful in combating it; on the contrary, the most beneficial mode of treatment appears to be that of moderately supporting the powers of the patient by wine and mild tonics.

Again, when the synovial membranes inflame, and the joints become enlarged and swollen, all stimulus should be withdrawn; but bleeding in this instance also appears unnecessary; a moderate action, however, of the bowels should be kept up by means of the sulphate of magnesia ʒ ſs. to ʒ j., out of camphor mixture; and, should the pain be severe, some opiate should be added, as ♏ xv. of the tinct. hyoscyami. Mr. Murray thinks so lightly of this affection that he says it was commonly removed in Aberdeenshire by warm fomentations.

The more formidable affection in scarlatina is dropsy; and from the great tendency to effusion into the head and chest, an active treatment is necessary. We should have imagined that in dropsy, a symptom in most cases of great debility, and following a disease whose characteristic is great depression, bleeding would have been dangerous and improper; but experience has shown that bleeding is at all times a prudent, if not a necessary measure: as soon, therefore, as œdema appears in the face, especially if accompanied by headache, some blood should be taken, or from 2 to 4 ounces in the child, and from 8 to 12 ounces in the adult. The rest of the treatment consists in purging the patient. The choice of the purgative must rest with the practitioner; but the bitartrate of potash in ʒ j. doses three times a day is among the most useful; digitalis also is much recommended, but it does not possess any specific virtue. When the danger is passed, 5 grains of salicine, or 5 to 10 grains of the tartrate or citrate of iron may be added to each dose of the salt.

Blisters have been much recommended as a means of relieving the throat, but their value is not yet determined. Some writers speak of mortification and death following their application, while others consider them as powerful auxiliaries. As a general principle they are unnecessary, and are better omitted; since the irritation they occasion may predispose the cervical glands to the tertiary action of the poison.

Gargles are unnecessary for children, for they cannot gargle, and they are rarely necessary for adults.

Dietetic and Preventative Treatment.—The diet of the patient should be slops, light nutritious broths, and jellies. Fumigation will not, it should be remembered, destroy the miasmata in the sick room; and consequently the doctrine of cleanliness, of ventilation, and of separation, are as imperative in this disease as in typhus. We cannot disinfect the walls of the chamber, nor the clothes of the patient, except by washing them, or else exposing them to a dry heat exceeding the boiling temperature. In general, then, the chamber where the sick patient has lain should be white-washed and well scoured after the disease has subsided, before any person susceptible of the poison be allowed to sleep in it.

OF THE POISON OF MEASLES.—MORBILLI.—RUBEOLA.

The measles are a continued febrile disorder, with certain local lesions, but more especially a peculiar inflammation of the skin, which runs a given course. This poison has the property of exhausting the susceptibility of the constitution to its action on the first attack. The number of persons that died of this disease in 1839 in England and Wales was 10,927.

Remote Cause.—The measles appeared at the same time and in the same country with scarlet fever, and have subsequently followed the same laws, namely, they now prevail all over the world, are little influenced by season, are constantly sporadic, and occasionally epidemic. Their poisons, it would appear, must consequently have a similar or telluric origin.

Predisposing Causes.—Measles, though incident to every period of life, are most frequently contracted in childhood, when it is difficult to trace the effects of accidental circumstances, so that our knowledge of the predisposing causes are most imperfect. Both sexes, however, appear to be equally liable to this affection. With respect to the influence of season, it is generally supposed that measles break out in the beginning of winter, increase till the vernal equinox, and then die away towards the summer solstice. The deaths, however, from this disease, registered in England and Wales in the years 1838, 1839, and 1840, show that the influence of season is exceedingly trifling. Thus there died in—

	January February March	April May June	July Aug. Sept.	Oct. Nov. Dec.
Deaths from measles in 3 years.	6932	7157	5543	6945

It is admitted by all authors that a patient labouring under measles generates a poison which is both infectious and contagious.

Infectious.—This disease, like scarlatina, is greatly infectious; and in like manner no susceptible person can remain in the same room, or even in the same house, without hazard of taking the disease. In the year 1824 it was imported into Malta by some children belonging to the 95th regiment, and spread extensively in that island, so that many natives died. This circumstance was the more remarkable, as the measles had not been seen in the island for many years. The *infecting distance* of this poison, it will be plain from what has been stated, must be considerable; indeed it is impossible to isolate it in our public schools or other large establishments.

Contagious.—The contagious nature of measles has often been proved by healthy children having been inoculated either by blood drawn from the arm of a measly patient, or else with serum taken from the vesicles which are occasionally found intermixed with the eruption,—an experiment which appears to have been first made by Dr. Home, with a view to producing a mild disease but as no such result has been obtained; the practice has been abandoned.

Fomites.—This disease is also propagated by fomites. The strictest demonstration of this law is, that the disease has been communicated by direct application of substances impregnated with the virus, in the attempts to inoculate for the measles; it is also proved by the clothes and boxes of children sent home from schools, where the disease has raged, communicating the disease; and also by the same circumstance resulting when susceptible children have lain in the same beds, or in the same room, shortly after it has been occupied by measly patients.

Susceptibility exhausted.—The morbillous poison having once produced its specific effects, as a general principle leaves the patient exempt from all liability to a second attack. This law may be considered as proved both by Willan and Rosenstein—the former affirming that after an attention of more than 20 years to eruptive complaints, he had not met with an individual who had twice had "febrile rubeola;" while the latter states, that in a practice of 44 years he had met with no instance of a second infection. There are, however, occasional exceptions to this law; one whole variety of this disease, or the rubeola sine catarrho, is supposed to afford no protection against an attack of the rubeola vulgaris. There are many exceptions also to the non-susceptibility of persons who have passed through the rubeola vulgaris, for Burserius, Robedieu, Home, Baillie, Rayer, and Holland have all seen instances of a second attack of the measles in the same individual.

Period of Latency.—The period of latency of this poison is determined to vary from 10 to 16 days. It seems also determined that the contagion of measles is generated as soon as the primary fever is established, and before the eruption appears.

Pathology.—The theory of measles is, that a poison is absorbed and infects the blood, and after a given period of latency acts on the great nervous centres, producing a continued fever, which does not remit on the appearance of the eruption, but runs on throughout the whole disease. The fever thus being established at the end of three, more generally of four, and in some few instances of five days, a certain secondary or specific inflammation of the skin and of the mucous membranes of the eyes, nose, mouth, fauces, and bronchi is set up in addition to the fever. In a few cases the poison has certain tertiary actions, and produces inflammation of the substance of the lungs, or of the pleura. As the primary fever lasts from three to five days, and the eruption from six to seven days, the whole duration of the disease is from nine to twelve days. Whenever the tertiary actions occur, the disease is much prolonged.

The law that fever precedes the specific actions of the poison has scarcely a recorded exception; and consequently, though the pyrexia may greatly vary in intensity, it is uniformly present. The fever which precedes the local lesions is termed the primary fever.

The second great law of the poison, or that its secondary actions are on two membranes, or on the skin and mucous membranes, has some exceptions; for the affection of the mucous membrane is entirely wanting in one variety, or in the morbilli sine catarrho. The law that the poison produces certain tertiary actions, as inflammation of the lungs, or pleura, is so well determined that it requires no proof, but we must regret that their proportional frequency is not ascertained.

Since the affection of the skin is uniformly present, while that of the mucous membranes is sometimes absent, the cutaneous eruption is necessarily the great characteristic of the disease; but the morbillous eruption being evanescent after death, we can only imperfectly trace its pathology. It first appears as a circular dot, similar to a flea-bite, slightly prominent, and sensible to the touch. Its colour is of a deep raspberry hue, and in rare instances, as in the morbilli nigri, is livid or black. In severe cases, also, especially if the patient be of tender age, the exanthema assumes a papular form, and when at its height, occasionally a vesicular form; and the latter is most common on the arms, the neck, or the breast. The colour of the exanthema is evanescent on pressure, but returns on the finger being removed.

The patches of the exanthema are extremely numerous, so that they leave little of the healthy skin intervening between them; and they not unfrequently become confluent, and form large maculæ, sometimes of a semi-lunar form. The principal seats of the exanthema are the face and back, while the parts least affected are the pudendal and popliteal regions. The inflammation attending the exanthema extends in some degree to the subjacent cellular tissue, for the face is tumid and swollen, but not so as to close the eyelids.

The eruption does not at once cover the whole body, but consists of three crops, each of which follows the other at an interval of twenty-four hours, the duration of each crop being three to four days. The course of the measles then is, that on the third or fourth day of the primary fever the first crop appears on the face, neck, and upper extremities; on the following day, the second crop covers the trunk; and on the third day the third crop appears on the lower extremities, so that the whole body is full of the eruption, which is now at its height. On the following day, the fourth of the eruption, the exanthemata begin to decline from the face, neck, and upper extremities; on the following day they fade from the trunk; and on the sixth or seventh day, they are evanescent over the whole body. They uniformly terminate by resolution, followed by a furfuraceous desquamation of the cuticle of the body generally.

The inflammation of the mucous membrane, of the eyes, and nasal fossæ, generally commences either with or before the primary fever, and consequently precedes the eruption by some days. This inflammation is perhaps for a few hours puliose, then diffuse, but quickly changes to the serous; for a profuse watery discharge from the eyes and nostrils shortly follows, termed the "coryza." This affection usually continues till the decline of the eruption, and in some cases later.

The mucous membrane of the mouth and fauces also inflames, but the inflammation differs from that of the eyes and nose in not being accompanied by any discharge. In other respects it is exactly similar to the cutaneous eruption, for a number of exanthemata, more or less confluent, are seen upon the palate, uvula, tonsils, and velum pendulum palati, and they equally terminate by resolution. They appear also at the same time with the eruption on the face, neck, and upper extremities, but do not decline till the eruption fades from the body generally.

The bronchial and tracheal mucous membranes are usually attacked, either before or at the same time with the buccal membrane, but whether the inflammation of which they are the seat is marked by the same characteristic eruption is not determined, for few patients fall at this early period of this disease. The cough and expectoration, however, which accompany it are constant, and the latter shows that it partakes of the same serous character as that of the nasal and ocular membrane. Again, towards the close of this disease, or even as late as the third or fourth day after the eruption has disappeared, the poison not unfrequently falls on the substance of the lungs or pleura; supposing it to fall on the substance of the lungs, it usually excites serous inflammation of that tissue, and the quantity of fluid effused is frequently so considerable as to stream from the lung as soon as its tissue is divided. In severe forms of the disease the poison may produce either the red or grey hepatization of the lung, but these results are rare. The pleura does not at all times escape the action of the poison; and the diffuse, the serous, the adhesive, and even the purulent inflammation may invade that tissue, and either destroy the patient or prolong his convalescence. Diarrhœa also is often an accompaniment of this disease, which renders it probable that the mucous membrane of the intestines may be the seat of a specific action of the poison.

Symptoms.—The symptoms of the measles result from the fever, and the consecutive local lesions. The varieties of the disease, however, are extremely few, for no instance is known of a morbillous fever without the secondary or specific actions following; but the poison is supposed sometimes to limit its action to one membrane, or to the cutis, and to exhaust itself on that tissue; and hence, the morbilli sine catarrho. The varying intensity also of the morbilli enables us to divide them also into two grades, or into the morbilli mitiores, and into the morbilli graviores. The arrangement, therefore, of the forms of this disease will be as follows:—

Morbilli sine Catarrho.—Morbilli mitiores.—Morbilli graviores.—The primary fever may make its attack suddenly, or be preceded for a few days with symptoms of a common cold, and in general the latter is the case; but in no instance is the primary fever, which is afterwards prolonged, and accompanies the eruption at any time, of great intensity; for although many fall from the severity of the local lesions, yet no instance is known of the patient being overwhelmed or destroyed by the general depressing action of the poison, as in typhus fever or in scarlatina. The depressing powers of the poison, however, are considerable, and are always sufficient to confine the patient to his bed for a few days, and to leave him, for a short time after the disease has subsided, weak and debilitated. The type of the fever of measles consequently greatly differs from that of typhus or of scarlatina, and the formidable brown tongue, so grave a symptom in the latter, is hardly known in the former, or only seen in a few fatal cases.

Morbilli mitiores.—The essential characters of this affection are, that the poison produces primary fever, and a specific inflammation of two membranes, as of the skin and mucous membranes, the fever not subsiding till the eruption dies away.

The symptoms of the measles may be divided into three stages; the first embraces the primary fever, or the period before the eruption, and may last from three to five days; while the second stage embraces the period of the eruption, and lasts from six to seven days. These two stages very commonly comprise the whole disease, whose usual course is from nine to twelve days. The third stage includes any inflammatory action which may be caused by the tertiary action of the poison, and therefore only occasionally exists.

The early symptoms of the primary fever are seldom severe, and greatly resemble those of an ordinary but severe catarrh. They are shivering, alternated with heat, frequent pulse, headache, derangement of the bowels, sometimes accompanied by nausea and vomiting; and these affections are so considerable that the patient usually takes to his bed. At the end of a few hours the fever becomes continued, and the specific action of the poison commences by the mucous membrane of the eyes and nose inflaming, so that the light is painful; the senses of smell and taste are lost, and this is followed by a copious discharge of serum from the nose and eyes.

The buccal and bronchial membranes may become affected at the same time, and the patient is then troubled with a frequent cough, which, according to Frank, has this peculiarity, that it occurs in paroxysms. The cough does not remit till about the seventh day, and is often accompanied by hoarseness, by a sense of constriction across the chest, by diarrhœa, and sometimes by ischuria. The duration of this first stage is three, four, or five, and Home states he has seen it last six days.

The second stage commences with the appearance of the eruption whose course and character has been described. On the appearance of the eruption the fever is often aggravated, but the distressing nausea and vomiting seldom last beyond the fourth day. The fever, therefore, together with the coryza, sneezing, coughing, hoarseness, and diarrhœa, continue with unabated severity till the eruption has reached its height, and is full out over the whole body, which is on the third or fourth day after its first appearance. From this period, in favourable cases, all the symptoms begin to decline; and on the eruption disappearing the cuticle desquamates, and the disease terminates on the ninth, tenth, or eleventh day from its commencement.

In a few cases, however, on the subsiding of the eruption, or about the ninth, tenth, or eleventh day of the disease, and in some instances earlier, the tertiary actions of the poison are set up, and inflammation of the substance of the lungs or of the pleura takes place, prolonging the duration of the disorder, and endangering the life of the patient. The inflammation of the bronchial membrane is denoted by the expectoration either of a thick viscid mucus or of pus, and which may or may not be streaked with blood, while the mucous or sonorous rattle will point out the peculiar seat and extent of the mischief. If the substance of the lungs be inflamed the breathing is more difficult, the cough more troublesome, and the countenance livid; but the loud mucous rattle which accompanies it seldom allows us to hear crepitation, or to determine the absence of respiration in any given portion of the lung. If the pleura be inflamed, we have, in addition to the cough, severe pain in the side—the *point de côté*, and the impossibility of filling the chest, except in a very limited degree; and this is often accompanied by dulness on percussion, hy bronchophony or ægophony, assuring us that fluid is effused into the cavity of the chest.

Morbilli graviores.—The characteristic of this severe form of measles is the exanthemata becoming suddenly black, or of a dark purple with a mixture of yellow. The early writers on measles describe this form of the disease as being much more common in their times than we find it to be in the present. Sydenham considers this appearance as extremely formidable, and that persons so seized are irrecoverably lost unless they are immediately relieved by bleeding and a cooler regimen. Willan says he has seen this discoloration, but thinks more lightly of it.

Morbilli sine catarrho.—When the measles have been epidemic, a few cases have been observed in which the fever and cutaneous eruption have constituted the whole disease; the mucous membranes being altogether free from coryza or other form of inflammation. Frank rejects this form as spurious, because it does not protect the constitution from a subsequent attack of the more ordinary form of measles.

Diagnosis.—The diseases with which measles may be confounded are scarlet fever and some forms of syphilitic eruptions. The diagnostic symptoms between measles and scarlet fever are numerous, for there are many differences both in their general laws and particular symptoms by which they may readily be distinguished. Thus, the periods of the latency of their poisons are different, that of scarlet fever being from two to ten days, while that of the measles is from ten to fourteen days. The exanthema in scarlet fever seldom appears later than the second day of the primary fever; in the measles it is delayed till the fourth day. In scarlatina the patches of the exanthema are large, and the surface they cover ample; but in measles they are not larger than flea-bites, and when most confluent the clusters are small. Their colour is also different, being of a bright red in scarlet fever, while in measles it partakes more of a raspberry hue. The affections of the mucous membranes are also different in the two diseases. In scarlatina the tonsils are almost constantly greatly enlarged and ulcerated, while in measles they are little or not at all affected. In scarlatina the eyes are free from coryza, while in measles that is the most prominent symptom. The tertiary actions of the poison are also different, being, in scarlatina, inflammatory affections of the joints, and dropsy; while in measles they are inflammations of the lungs or pleura; and, lastly, in measles the fever usually subsides on the disappearance of the eruption; but in scarlatina the fever often continues many days or weeks after the eruption has run its course, or till the sore throat has healed.

Prognosis.—The mortality from measles greatly varies in different years. Percival says, that out of 3807 cases of measles, 91 died, or 1 in 40. Watson says, that in one year, at the London Foundling Hospital, 1 in 10 died; and in another, 1 in 3. In the same establishment also in 1794, out of 28 cases none died; in 1793, out of 69 cases 6 died; in 1800, out of 66, 4 died; and the aggregate of these data will give as an average of 1 death in 15: so that the prognosis in every case of measles is favourable. The prognosis, however, is more favourable in the country than in the metropolis; for it appears by the registrar-general's report, that in the year 1839, the proportion per cent. of the population that died of measles in London was as ·107; while, in England and Wales, it amounted to no more than ·071.

Treatment.—The measles differ from scarlet fever not only in the fever being much less depressing, but in their running a shorter or more definite course, and in their having no tendency to terminate in ulceration or mortification. The measles, therefore, though depending on a morbid poison, approximate to the phlegmasiæ compared with scarlet fever, for the constitution is little impaired by the short continuance of the disease, and consequently they admit of a more strictly antiphlogistic treatment.

As no antidote is known to the poison of the measles, the disease will run its course whatever treatment we adopt. The rule of treatment, therefore, is to interfere as little as possible as long as the disease is safe, and merely to moderate symptoms when they threaten danger, and to subdue them, if possible, when danger really appears.

The *morbilli sine catarrho* are usually so mild a form of disease as to require no other treatment than a milk diet and the customary attention to the bowels. In the *morbilli mitiores*, however, the cough, the frequent vomiting, and the heavy catarrhal symptoms which so generally attend the primary fever, render medical attendance necessary from the first moment of the attack. The treatment of these symptoms, however, and also of the eruptive stage, as long as the patient continues free from any serious inflammatory affection of the lungs, need not necessarily be active, it being sufficient to alleviate the cough, allay the vomiting, and check the catarrh by some of the large class of neutral salts which afford so many useful remedies. In making our selection from these we must be principally guided by the state of the bowels and the condition of the stomach. If the bowels be constipated, the milder purging salts, as the sulphate of magnesia or the sulphate of soda in ʒ ſs. or ʒ j. doses ex. mist. camphoræ 6^{tis} vel 4^{tis} horis are to be preferred. On the contrary, if the patient be purged, and the vomiting distressing, the mist. potassæ citratis effervescens is the most beneficial. There are many persons in whom the cough and catarrhal symptoms are the most urgent, and in such cases, if the stomach be quiet, the liquor ammoniæ acetatis in ʒ ſs. doses cx. mist. camphoræ, from its more powerful action on the skin, is an excellent substitute. Another remedy equally or perhaps still more useful, is ipecacuanha, of which, gr. j. vel gr. ij., may be given 6^{tis} vel 4^{tis} horis. Some practitioners prefer antimony to ipecacuanha, but antimony appears, at least in large doses, to act in some instances perniciously on the lung.

The treatment which has been specified is, in many cases, all that is necessary throughout the whole course of the disease; and the greatly extended experience of Willan has hardly enabled him to enlarge it. He thinks, however, that an emetic given on the second or third evening *somewhat* alleviates the violence of the catarrhal symptoms, and contributes to prevent the diarrhœa which usually succeeds the measles. During the eruption, he adds, "I have not observed any considerable effect from antimonials or other diaphoretics." Bathing the feet every evening seems a more beneficial application. Emulsions and mucilages afford but a feeble palliation of the cough and difficulty of breathing. With respect to opiates, Sydenham gave an opiate every night throughout the whole course of measles; but in the early stages, according to Willan, it produces an increase of heat and restlessness without conciliating sleep.

The catarrhal symptoms are frequently accompanied, even in the very earliest days of the disease, with much bronchial inflammation, and sometimes with pneumonia; or these affections may occur at any later period after the decline of the eruption, or from the tenth to the twelfth day of the attack. This great tendency to pneumonia has caused the question to be agitated, whether bleeding ought not to be adopted as part of the treatment of this disease in all cases, either as a means of cure or as a precautionary measure, or whether it should be reserved until the pneumonic symptoms are present. Experience has shown that bleeding may be practised with impunity in the very first onset of the disease, or at any subsequent stage. Willan, however, is of opinion that it is very rarely necessary to bleed before the subsidence of the eruption; for, if we wait that event, we "usually find the pulse become moderate, and the uneasy, laborious respiration terminate in 24 hours. This oppressed breathing is common to other eruptive fevers; and if it were universally to be considered an indication for bleeding, the practice would often be more fatal than the disease." If, however, pneumonia or pleurisy be clearly established, blood should be freely, but not extravagantly, taken; for it should be remembered that although some children bear the loss of blood well, yet that others are long in recovering from it even when the quantity drawn is small. In children, then, below 10 years of age it is more prudent to take blood frequently and in small quantities than in a large quantity at once. We should likewise be content with moderating the symptoms, for, as the inflammation depends on a morbid poison, it has a course to run, and does not admit of a sudden cure. The bleeding should also be more moderate during the eruption than after it; for we have a right to look for a diminution of all the symptoms when it disappears. Blisters, ipecacuanha, and mercury, are amongst the best adjuvantia to bleeding in these cases.

During the whole course of the disease it is necessary to enjoin an abstinence from all animal food, and to limit the patient to a low diet and to slops. The chamber should be of a moderate temperature, and not subject to any sudden change from heat to cold, and the strictest cleanliness should be observed. In large establishments separation is necessary to prevent their spreading.

Of the Small-pox or Variolæ.

The small-pox consists of a remittent fever, of an eruption which runs a given course, and of certain occasional tertiary affections. This poison has the property of exhausting the susceptibility of the constitution to its future action on the first attack. In the year 1839 there died of this disease, in England and Wales, 9131 persons.

Since the first appearance of the small-pox at Mecca, two great epochs have occurred in its history. The first is the discovery of the singular and beneficent law, that the destructive agency of this poison is greatly mitigated by introducing it into the system by means of the cutaneous instead of the mucous tissues, or of *inoculation;* and, secondly, the still more wonderful fact, that the vaccine poison, though differing in many of its laws from the variolous poison, has the extraordinary and unlooked-for property of protecting the constitution, and rendering it altogether insusceptible to the action of that deleterious agent.

Remote Cause.—The same obscurity hangs over the remote cause of small-pox as over those of measles and of scarlatina. While, however, the causes of these two latter diseases seem still active, there is every probability that of small-pox has subsided, and that this disease has now no other source than human contagion. It is singular, however, if depending on human contagion, it should still occasionally assume an epidemic character—a circumstance, perhaps, owing to the gradual accumulation of susceptible unprotected persons. In whatever manner this poison is produced, season does not appear greatly to influence its ravages; for according to the registrar-general's report, there died in 1840, in the winter quarter, 2071 cases; in the spring quarter, 2476; in the summer quarter, 2274; and in the autumnal quarter, 3613.

Predisposing Causes.—There are so few persons susceptible of the poison who escape infection, when exposed to its influence, that the subject of predisposing causes has not been much studied. There are circumstances, however, not easily appreciable which do predispose to this disease; for example, a gentleman long accustomed to frequent the small-pox hospital, and even to make drawings from the deceased with impunity, at length took the disease from being accidentally in the same room with a variolated corpse. A nurse, also long attached to that hospital, and in constant attendance on the small-pox patients, went into the country for a short recreation; but on her return she became infected, and passed through the disease. This susceptibility or insusceptibility to the poison depends partly on the constitution and partly on accidental circumstances. Mr. Hunter states he inoculated a number of slaves off the coast of Africa, and that those that took the disease before the Harmattan all did well, but such as were not seized with the symptoms when that wind began to blow, and they were sixty in number, never felt any other than a slight nausea and fever during the continuance of the wind. After, however, it had changed, the small-pox appeared in twenty, but the others were obliged to be re-inoculated, when they all did well.

Both sexes and all periods of life are equally liable to this affection. The ages, however, at which persons are attacked, as deduced from the ages at which they have died, of the small-pox, are as follows:—

Deaths of Males and Females from Small-pox.

Months Old.	Died.	Years Old.	Died.	Years Old.	Died.	Years Old.	Died.	Years Old.	Died.
0	202	0	2,235	10	226	40	43	75	4
1	181	1	1,524	15	226	45	22	80	10
2	162	2	1,197	20	240	50	13	85	1
3	456	3	869	25	148	55	10	90	0
6	646	4	628	30	93	60	19	95	1
9	588	5	1,122	35	75	70	10	Unknown	8

The small-pox once engendered, the person of the patient generates a poison which is both *infectious* and *contagious*.

Infectious.—This disease is so infectious, that not only is it unsafe for a susceptible person to be in the same room, or in the same house, with a party labouring under the disease, but it has often been caught by passing a child in the small-pox in the street, and even on the other side of the way; so that "to expose a person in the public highway, infected with this contagion, is considered a common nuisance, and indictable as such." The dead body of a variolated person is equally infectious, and students, who have merely seen it when brought into the dissecting-room, have in consequence fallen ill of the disease. The *infecting distance*, therefore, must be many yards around the patient's person: indeed, with every precaution, there is great difficulty in preventing it spreading from ward to ward, even in large hospitals.

Contagious.—The fact of the contagious nature of small-pox has been fully demonstrated by the once general practice of inoculation; and the poison by this operation has been proved to exist in the serum, in the pus, and in the crusts of the small-pox pustule. There is no law more singular and unexpected, in the whole range of morbid poisons, than that the introduction of the variolous poison, by means of the cutaneous tissue, should produce an infinitely milder disease than when the same poison is absorbed by a mucous tissue. It appears essential, also, that it should pass *through* the skin; for when the puncture has been made deep, so as to see "a bit of fat," the disease which has ensued has hardly been mitigated. The contagion, per *Fomites*, besides being shown by the practice of inoculation, has been demonstrated by the disease spreading almost all over the continents of Africa and of America, by the transmission of an infected blanket, or other article of clothing. One lady caught it by putting on a shawl worn by her friend, who had just fallen ill of the disease. Dr. Gregory mentions the wife of a registrar-general, with whom he was sitting, taking the disease from a nurse who came to announce the death of a parishioner by the small-pox, the contagion being brought, as is supposed, in the woman's clothes.

The length of time fomites may remain infected may be seen from the fact of the Hindoos seldom inoculating but with matter a twelvemonth old.

Susceptibility exhausted.—The small-pox has the property, in common with measles and scarlet fever, of exhausting, on the first attack, the susceptibility of the constitution to the future actions of the poison. This law, however, is not without some exceptions, and in the late epidemic at Marseilles, Bousquet considered one person in one hundred was attacked a second time with small-pox. In some few instances even a second attack has no protective influence. Dr. Roupel. says he met with an instance in which small-pox occurred three times in the same person. The lady of a Mr. Guinnett had it five times. Dr. Maton speaks of a lady who had it seven times; while Dr. Baron mentions a surgeon of the South Gloucestershire militia, who was so susceptible that he took the small-pox every time he attended a patient labouring under that disease.

Co-existing.—The variolous poison is capable of *co-existing* with many other poisons, and also of influencing their actions, and of being reciprocally influenced by them. Dessessarz has seen variolæ co-exist with scarlatina and with hooping-cough; Cruikshanks with measles; Frank with psora; and Dimsdale with syphilis. A patient was admitted into St. Thomas's Hospital with tertian ague; the ague subsided and the small-pox appeared. The small-pox having run its course, the ague immediately returned. Ring mentions a case of triple disease co-existing, or of small-pox, measles, and hooping-cough, and they all ran their course together.

The reciprocal influence, however, of the variolous and the vaccine poisons over each other is among the most remarkable phenomena incident to morbid poisons; for the poisons being introduced into the system together, the one disease may precede the other, or they may co-exist. But either disease having run its course, the constitution, as a general law, is protected not only against the action of the poison that produced it, but also against the action of the other poison. Thus, a patient having had the small-pox is guarded not only against the small-pox, but also against the cow-pox; and, on the contrary, the cow-pox poison guards the constitution against the cow-pox, and also against the small-pox. There are many exceptions, however, to this law, which will be shown when treating of the vaccine disease; but still the exceptions are too few to invalidate the general principle, or to render the practice of vaccination less advisable and less practically useful.

The variolous poison, it will have been seen, may be introduced into the system either by a mucous membrane or by the cutaneous tissue, and that when introduced by the mucous tissues, it always produces a disease of great malignity and frequent fatality, or the *natural small-pox*. While, on the contrary, when introduced by the cutaneous tissue, or by *inoculation*, it almost always produces a mild disease, rarely attended by any fatal result. In whichever way, however, it is introduced it infects the blood. The proof of this law is, if blood be taken from a patient labouring under small-pox, and be injected into the veins of a dog, the animal dies, although a similar injection of healthy blood would not be attended with any inconvenience. A stronger proof, if possible, is, that many children have been born covered with the small-pox eruption; and it is remarkable that this pathological phenomenon has taken place, not only when the mother has been labouring under the disease, but also when she has been entirely free from it. In some cases there has appeared reason to believe that the child must have gone through the disease while yet in utero; while Dr. Jenner thinks he has seen cases in which the child must have been infected in utero, and so lately that the disease has appeared within a few hours after birth.

Period of Latency.—The variolous poison having infected the blood, lies in latent combination with that fluid a period of time which varies according to another remarkable law, or according as the poison has been introduced by the mucous or cutaneous tissues. In the former case, or in natural small-pox, for example, the more usual time of latency is from ten to sixteen days, while in the inoculated small-pox the period of latency is only from seven to nine days. The extremes, taking both forms of the disease, being from five to twenty-three days. It is not yet determined at what period this poison is first generated by the patient's person, or whether, during the primary fever, or not till after the eruption has appeared; but, as in measles, it is probably secreted during the primary fever.

Pathology.—The theory of the small-pox is, that a poison is absorbed and infects the blood, and after a given period of latency, gives rise to "primary fever," which lasts from two to four days, till the eruption appears, when it for the most part *remits.* The eruption, or secondary, or specific action of this poison affects the skin, and also the mucous membrane, of the eyes, nose, of the mouth, and of the fauces. It runs a given course of vari,* of vesicle, and of pustule, and when full out, or at its height, the febrile phenomena, which had remitted, return, and give rise to what is termed the *secondary fever.* The tertiary actions of the poison are inflammation of the various tissues of the lungs, affections of the urinary organs, and lastly of the cellular tissue of the body generally, which often becomes the seat of an endless number of abscesses.

The law, that fever precedes the secondary or specific actions of the poison, or the appearance of the eruption, has scarcely an exception, and indeed in some instances it has been of so severe a character as to have destroyed the patient on the first onset. The remission or subsidence of the fever is also constant in mild cases, but in the severer forms of the confluent small-pox it sometimes runs on, and is constant. The recurrence of the "secondary fever," and the exacerbation of the fever in severe cases at the time of the maturation of the pock, is also constant. The cause of this secondary attack has long been a difficulty in the history of small-pox, some attributing it to a remittent nature of the fever, while others consider it to result from the maturation of the pustules, and to be a *suppurative* fever. The former, however, seems the most probable explanation.

The second great law of small-pox, or that the secondary actions of the poison occasion a peculiar eruption, has only a few rare exceptions, or the variolæ sine eruptione. With that exception the eruption is uniformly present; but the affection of the mucous membranes is often wanting in mild cases, though rarely absent in severe ones. The law also that the poison produces many tertiary actions, as inflammation of the lungs, of the urinary organs, of the eye, and of the cellular tissue, is generally admitted. These actions, however, are often wanting in mild cases, and it is to be regretted that the proportionate frequency of their occurrence is not determined.

The small-pox pustule, which is the great characteristic of the disease, runs a given course of about eleven days, and in its progress undergoes many mutations, being at first tubercular, then vesicular, then pustular, and lastly it forms the scab or crust. These various changes form so many stadia of unequal duration. The first, or tubercular stage, lasts from twenty-four to forty-eight hours; the second, or vesicular stage, four days; the pustular stage three days; while the last stage, or that of scabbing, lasts three days more, making the whole duration of the *normal* pustule ten or eleven days. There are varieties, however, of this disease, in which the formation of the pustule is irregular, as in the *confluent* and *horn* small-pox, and in the latter the two last stages are singularly shortened, or else absent altogether.

The distinct small-pox, then, consists, on the first appearance of the eruption, of a number of small red tubercula or vari, about the size of a pin's head, more or less numerous, but separate and distinct from one another, and scarcely salient. On the second or third day the second stage commences, and a small vesicle, which gradually enlarges, bound down and depressed in the centre, or *umbilicated,* forms on the apex of each varus, and contains a clear whey-coloured fluid. This stage lasts about four days, when the pustule maturates. This process is so gradual, that Dr. Watson says, if you examine the pustule closely about the fifth or sixth day you may see, at least in many, two colours, viz. a central whitish disk of lymph, set in, or surrounded by, a circle of yellowish puriform matter. "In truth, there is in the centre a vesicle, which is distinct from the pus, so that you may puncture the vesicular portion, and empty its contents without letting out any of the pus, or you may puncture the part containing the pus and let that out without evacuating the contents of the vesicle." While this change also is going on, a damask red areola forms around each pustule, and as the vesicle fills the whole face swells, and often to so great a degree, that the eyelids are closed. When the maturation is complete the "*bride,*" which bound down the centre of the vesicle, ruptures, and the pustule now becomes spheroidal or *acuminated.* About the eighth day of the eruption a dark spot is seen on the top of each pustule, and at that spot the cuticle ruptures, and allows a matter to exude, which concretes into a scab or crust, and during this process the pustule shrivels and dries up. This crust is detached between the eleventh and fourteenth days, leaving the cutis beneath of a dark reddish brown, a discoloration which lasts many days or weeks. On the face, however, the pustule often penetrates or burrows, so as to cause ulceration of the rete mucosum, and to leave a permanent depression or "pit," greatly disfiguring the person. The cicatrix formed on filling up of these ulcers, though at first of a reddish-brown, is ultimately a dead white colour.

The small-pox eruption does not appear over the whole body at once, but, like the other exanthemata, appears in three successive crops. The first crop covers the face, neck, and upper extremities, the second the trunk, while the third appears on the lower extremities. There is usually an interval of several hours between each crop, and by how much the later the pustules are in appearing on the trunk and lower extremities than on the face and neck, by so much the later they are in maturating and in disappearing from those parts.

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* Varus, a small tumor.

The number of pustules is very various, sometimes not exceeding five or six over the whole body, more commonly from one to three hundred, and occasionally amounting to several thousands. It has been calculated, if ten thousand pustules be counted on the body, that two thousand at least will be found on the face, and accordingly the number of pustules on the face being in proportion those on the other parts of the body, is a fair estimate of the extent of the disease, and of the danger of the patient.

The pustule is subject to many irregularities, both as to its form and course, and which give rise to two very marked varieties of the disease, or to the confluent and to the horn small-pox. The confluent small-pox differs from the distinct small-pox in the tubercula or vari being small, less prominent, and so numerous that even on the first appearance of the eruption there is hardly any distinct separation between them. The vesicles which form on their apices appear earlier, and their diameters increase more irregularly than in the distinct forms, and often they run one into the other. The pustules likewise, which are confluent, either remain flat and do not rise, or else, the cellular tissue rupturing, they form large bullæ or bladders, (variolæ corymbosæ) and are not encircled with the usual red areola round their base; neither do their fluid contents always acquire the yellow colour and thick purulent consistency of the milder disease. Their crusts, moreover, are soft, and do not fall off till many days after the usual period, or not till the eighteenth or twentieth day, or even later; and when the desiccation is completed and the crust detached, a deep scar or pit, sometimes an extensive seam, shows the destructive ulceration that has taken place beneath them.

The horn small-pox is a variety of the distinct small-pox, and is by much the mildest form of the disease. The pustule in this variety passes through the stages of vari and of vesicle, but on the fifth or sixth day of the eruption, instead of maturating, the pustule shrivels, desiccates and crusts, and the disease terminates three or more days earlier than the usual course, and without the occurrence of any secondary fever. This is the form of the disease which so usually follows after vaccination.

Many other varieties have been described by the old masters: Sydenham, for instance, speaks of a black small-pox; Mead, of a blood small-pox; Friend, of a siliquous small-pox, in which the pustule resembles a small hollow bladder, but contains no fluid. These varieties of the pustule were probably occasioned by improper treatment, or by some rare idiosyncrasy of temperament, and are consequently not mentioned by modern writers. There is one variety, however, which is not uncommon, which is the crystalline or pearl pock (*variolæ crystallinæ*), in which the vesicle continues transparent, seldom maturates, and has a tendency to become confluent. Every variety of the eruption, also, when the disease is severe, may be intermixed with petechiæ.

The cutis is more particularly the seat of the variolous eruption; but let the affection be at all severe, the mucous membrane of the conjunctiva, of the palpebræ, of the nasal fossæ, of the mouth, and of the pharynx, are covered with it. The variolous poison consequently produces an eruption on two classes of membranes, or on the skin, and on the buccal and facial mucous membrane. It has been much disputed whether the eruption forms on any other of the mucous membranes, and as a general principle it does not; but Martinet found, in a man that died on the eighth day, the rectum covered with variolous pustules. Rostan has seen the alimentary canal garnished with pustules similar to those of the mouth, from the œsophagus to the rectum. Sir Gilbert Blane also met with pustules on the mucous membrane of the intestines in two cases that died in the West Indies: and Rayer has given a plate representing pustules on the mucous membrane of the trachea. Dr. Mead's experience has made him state that, "I myself have seen subjects in which the lungs, brain, liver, and intestines were thick beset with pustules." Dr. Pitzholdt, in the morbid anatomy of small-pox, says he has seen the peritoneum covering the liver and the spleen, presenting appearances which he felt justified in regarding as the product of the small-pox.

The pustules which form on the mucous membranes have not been very distinctly studied either as to their course or phenomena. Rayer terms them *rudimentary* pustules; they probably, however, undergo the usual mutations of vari, of vesicle, and perhaps of pustule; but their course is shorter than when they occur on the skin; neither do they crust, although they sometimes run into ulceration.

Salivation is a common symptom in small-pox; but whether the salivary glands are affected in consequence of an extension of this inflammation, or from a tertiary action of the poison, is not determined. The small-pox having been chiefly studied previous to any sound knowledge of morbid anatomy, or of the laws of morbid poisons, its tertiary actions are as yet but imperfectly known; but about the eighth day in the distinct, and the eleventh day in the confluent small-pox, a secondary fever is established, and at the same time a new series of phenomena present themselves in a few severe cases,—as affections of the lungs, of the urinary organs, or of the cellular tissue of the body generally.

The most frequent affection of the lung is hæmoptysis, but occasionally inflammation of those organs takes place. The mucous membrane, for instance, of the trachea is found often covered with a thick semi-purulent muciform matter, peculiar to small-pox, irregular or honey-combed at its free surface, and which being removed, the subjacent tissue is found diffusely inflamed. The substance of the lungs also is occasionally found inflamed in every degree, even to purulent infiltration. The pleura also, according to Dr. Gregory, is peculiarly disposed to inflammation, which comes on about the eleventh or twelfth day, for the most part very suddenly, proceeds rapidly to empyema, sometimes destroying the patient in thirty-six hours. The pleura does not merely run into suppuration, but takes every other form of inflammation to which it is at any time liable.

The tertiary action of the variolous poison on the urinary organs and on the uterus is seen in the frequent occurrence of hæmaturia, and in the occasional formation of abscess of the kidney; while its action on the uterus is manifest from menorrhagia in the unimpreg-

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nated state, and also of frequent miscarriage when the patient is parturient.

The cellular tissue of the body generally is also acted upon by this poison. In two cases examined a few hours after death, the bodies could with difficulty be laid on the table, the skin being detached by the pressure necessary to raise them; the serous coat of the intestines also separated from the mucous and muscular coats with the greatest facility for many feet, and apparently could have been entirely peeled off. In one of these cases, also, the finger could be thrust through the walls of the heart with ease, as if the muscles of that organ had become unnatural, soft, and broken down. This affection of the cellular tissue generally also is seen in the great tendency in some cases to the formation of abscess on the subsidence of the eruption; for 20, 30, and even more small abscesses will sometimes form on a limb or other part of the body in most formidable succession, and which, being opened, are found to contain a sanies, or, only in a few instances, laudable pus.

The different lesions that have been mentioned are not the only miseries from which the patient may suffer; for these are often followed by sequelæ even more formidable than the preceding phenomena, as blindness, deafness, or lameness. With respect to blindness, it is generally supposed that pustules form on the conjunctiva or cornea, the inflammation then extending to the deeper-seated parts, and thus destroying the eye. Mr. Marson, however, surgeon to the Small-pox Hospital, says that, according to his experience, "the eye seems to possess a complete immunity from the small-pox eruption, and that although it sometimes extends to the inner margins of the eyelids, the particular local affection that causes the destruction of the organ of vision in variola begins generally on the 11th or 12th day, or later, from the first appearance of the eruption, and when the pustules in every other part of the body are subsiding. It comes on after the secondary fever has commenced, with redness and slight pain in the part affected, and very soon an ulcer is formed, having its seat almost invariably at the margin of the cornea. This continues to spread with more or less rapidity, and the ulceration passes through the different layers of the cornea, until the aqueous humour escapes, or till the iris protrudes. In the worst cases there is usually hypopion, and when the matter is discharged the crystalline lens and vitreous humour escape. In some instances the ulceration proceeds very rapidly; I have more than once seen the entire cornea swept away within 48 hours from the apparent commencement of the ulceration; and what is singular, now and then the mischief goes on without the least pain to the patient, or his being aware that anything is amiss with his eyes." This gentleman calculates that in 1000 cases 26 had ophthalmia, or about 1 in 39, and of these 11 lost an eye each, or 1 in about 100.

The inflammation of the buccal membrane may extend to the Eustachian tube, causing suppuration of the ear, and sometimes permanent deafness. It may spread also to the glottis; and the patient has been known to die suffocated by effusion into the cellular tissue around it, causing occlusion of the aperture. Sometimes it has terminated in ulceration, with the loss of a portion of the nose, or in a caries of the jaw-bone, or in enlargement of the glands of the neck.

Such are the pathological phenomena of the small-pox. Death, however, according to the experience of Jenner, Mead, Maitland, and others, has not unfrequently anticipated their action, and destroyed the patient during the primary fever, and before any of them could be set up.

Symptoms.—The species of small-pox are the natural small-pox, the inoculated small-pox, and the small-pox after vaccination. Of the natural small-pox there are three varieties, or the variolæ sine eruptione, the variolæ discretæ, and the variolæ confluentes.

Symptoms of the variolæ sine eruptione.—Sydenham and Frank have observed in every variolous epidemic, that some few persons who have not previously had the small-pox, or, according to Frank, have neither had the small-pox nor been vaccinated, are seized, during the time the small-pox is raging, with all the symptoms of primary variolous fever, and which having subsided, they have afterwards been found insusceptible of the disease. Sydenham states that he has seen fatal cases of this kind attended with purple spots and bloody urine; and hence the variolæ sine eruptione.

Symptoms of the variolæ discretæ.—Of the variolæ discretæ there are two varieties, or the variolæ discretæ, and the variolæ discretæ verrucosæ.

The symptoms of variolæ discretæ, or of distinct small-pox, may be divided into three stages. The first stage comprises the primary fever, which commences with the disease and terminates with the appearance of the eruption. The second stage commences with the eruption and terminates with the appearance of the secondary fever. The last stage commences with the secondary fever, and includes all the subsequent phenomena.

In the adult the symptoms of the first stage are not to be distinguished from those of the first stage of typhus; but in children there is a greater tendency to vomiting, and the brain also is more oppressed with drowsiness, stupor, or coma, and followed occasionally by convulsions. Sydenham says, when children, especially after dentition, are seized with convulsions during the primary fever, it is a sign the eruption will shortly appear. The ordinary duration of this fever is four days, and it may be sudden in its attack, or be preceded by some days' illness, in which case the most prominent symptoms often are severe muscular pains simulating rheumatism.

On the fourth day inclusive from the first attack of the primary fever, sometimes sooner, and but seldom later, the eruption appears, and the second stage commences. The phenomena of the second stage are as a calm succeeding to a storm; for, on the appearance of the eruption, the fever remits, the heat abates, the affection of the head subsides, the vomiting ceases, and the pulse returns to its natural standard, and consequently the febrile phenomena have altogether disappeared.

The number of pustules varies, according to the severity of the case, from 20 to some thousands. They appear, as has been stated, in a succession of crops, or first on the face, neck, and upper extremities; then on the trunk, and lastly on the lower extremities, and run the course, and undergo the various mutations of varus, vesicle, and of pustule already described. About the eighth day of the disease, however, or when the eruption is fullest out over the whole body, and the pustules of the face begin to maturate, the whole face, head, and neck swell, particularly the eyelids, which often close and blind the patient; the swollen parts also throb and are painful when touched. The intumescence of these parts lasts three days, during which the spaces between

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the pustules inflame, and are of a deep red or damask-rose colour, and the closer this resemblance the milder the subsequent affections.

It is during this period of intumescence that the fever which had remitted returns, and the third stage, or that of secondary fever, commences. This attack, in cases of ordinary intensity, is marked by a considerable increase of heat, by a frequent pulse, and by slight delirium, from which the patient is easily aroused. If, however, the disease be of greater intensity, hæmaturia, hæmoptysis, or a hard dry cough are added. In favourable cases, the swelling of the face, the redness of the intervening spaces, and also this secondary fever, having lasted from the eighth to the eleventh day, subside, and the pustule, now fully ripe, bursts and discharges a thin yellow matter, which, concreting into a crust, falls off on the fourteenth or fifteenth day, and the disease terminates.

When, however, the disease assumes an unfavourable character, and threatens a fatal termination, the face, which ought to have been intumescent on the eighth day, remains without increase of size, and the spaces which ought to have inflamed are pale and white. The pustules also, says Sydenham, look red and continue elevated, even after death, and the sweat, which flowed freely up to this day, suddenly ceases. At this critical period the secondary fever, instead of its usual sthenic character, may assume one of two forms, or that of the second stage of typhus, with brown tongue, frequent pulse, and delirium, or else the patient may be overwhelmed with the depressing influence of the poison, and sink almost without experiencing a re-action, the pulse being hardly increased in frequency, the heat of the body natural, and the intellect unimpaired. But the patient suffers from an indescribable restlessness, an inexplicable anxiety, some cough, with sickness, a frequent desire to pass urine, and with these symptoms he dies after a short struggle.

In cases of any degree of severity, even in the variolæ discretæ, the poison acts not only on the skin but also on the buccal and ocular membrane, and produces an eruption of pustules on those parts. This additional affection, however, does not appear to aggravate the fever, or to occasion other inconvenience than what arises from the local disease. The buccal eruption is usually preceded and accompanied by soreness of the throat and difficulty of swallowing; but these symptoms do not exceed those of a common sore throat. The pustules also, which form within the eyelids, are not attended with much pain, and it is only when the swelling has subsided that the mischief which sometimes takes place is discovered.

Symptoms of the variolæ discretæ verrucosæ, or horn small-pox.—The symptoms of this variety are similar, but milder than those of the preceding disease, for the primary fever is little more than a febricula; the pustules do not exceed half a dozen to two or three hundred, and having passed through the stages of varus and of vesicle, they on the eighth day, or about the usual time of maturation, shrivel, desiccate, and crust. The secondary fever also, often so fatal, does not recur, so that the convalescence usually commences on the eighth day, and the disease is terminated on the eleventh.

Symptoms of the variolæ confluentes.—The confluent small-pox is described by Sydenham as beginning with symptoms similar to those of the distinct small-pox, but more violent. The first stage, or primary fever, being attended with more sickness and vomiting, with greater heat, with more severe muscular pain, with more considerable delirium, and in children often on the evening before the eruption by convulsions. This fever is not only more intense than in the distinct kind, but is also of shorter duration, the eruption appearing more generally on the third day, or even earlier; and by how much the sooner the pustules appear, by so much the more confluent is the disease that follows. The eruption is often preceded also by an extensive erythematous or erysipelatous inflammation, and the vari come out irregularly, or in small clusters, like the measles, and are less eminent than in the distinct small-pox.

When the second, or eruptive stage, is formed, the primary fever remits, but not so completely as in the distinct kind, for the pulse often continues frequent (110 to 120 in a minute), the tongue white, and even the delirium may recur in the evening. This eruption also has some remarkable characters, for the pustules, especially those of the face, do not rise, they are more irregular and flatter in their forms, and from their greater number and contiguity run into each other, or are confluent, sometimes forming bullæ as large as a hen's egg.

Another symptom also sometimes seen in the distinct, never fails to accompany the second stage of confluent small-pox, or *salivation*. The salivary discharge begins either with the eruption or within a day or two after, and is then thin and copious, resembling the ptyalism by mercury. About the eighth day, however, it becomes viscid, and is expectorated with difficulty; while in bad cases it either ceases for a day or two and then returns, or else it disappears altogether. Children are not so liable to this salivation as the adult, but in them a vicarious diarrhœa often appears, but not constantly, neither does it occur so early in the disease. It is frequently profuse, unless checked, and often proceeds till the disease terminates.

It has been stated, that on the appearance of the eruption and the commencement of the second stage, although the fever is mitigated, it does not altogether subside, but that the affection of the head, the frequency of the pulse, and greater heat of the surface, often continue. With these ominous symptoms then still present, on the eighth day of the eruption, or the 11th day of the fever, the third stage, or secondary fever, commences, bringing with it new sources of anxiety to the physician and of danger to the patient.

"The confluent small-pox," says Sydenham, "does not in the least endanger life in the first days of the illness, unless there happens a flux of blood from the urinary passages, or from the lungs. Yet, on the decline of the disease, or on the 11th, 14th, 17th, or 21st days the patient is often brought to such a state that whether he will live or die is equally uncertain. He is first endangered on the 11th day by a high fever, attended with great restlessness and other symptoms, which ordinarily prove destructive, unless prevented by medicine. But should the patient outlive this day, the 14th and 17th are to be apprehended, for a very vehement fit of restlessness comes on every day towards evening, and there is the greatest difficulty in saving him.

The fatal symptoms of the third stage are, the absence of the usual redness in the intermediate spaces, the non-intumescence of the face, the suppressed salivation, cough, with hæmoptoï, or hæmaturia, and great restlessness. Sometimes other symptoms are added to these, as a brown tongue, delirium, petechiæ, or a black spot in the centre of each pock, scarcely so big as a pin's head, or else a disposition to gangrene in the large vesicles; and when these symptoms are present few persons survive this terrible crisis. In some cases, however, the event is favourable, and the patient is restored, but the struggle is sharp and the convalescence long, and in its progress an endless series of abscess may form, or inflammation of a joint take place and produce lameness, ulceration of the cornea, blindness, otitis or deafness, while the deeply-scarred face is a lasting record of the severity of the disease, and of the great danger the patient has survived.

Symptoms of Variolæ post Vaccinationem.—The symptoms of this form of the disease are in the great majority of cases those of the variolæ discretæ verrucosæ. In a few instances, however, they are those of the distinct and still more rarely those of the confluent small-pox; but whatever form they may assume their *comparative* mildness is their great characteristic.

Symptoms of Variolæ post Inoculationem.—The phenomena which result from the introduction of the variolous poison by means of the cutis differ in many respects from those that occur in the natural small-pox, and they are as follows:—On the day after the operation is performed, though it take effect, little alteration is discovered in the punctured part. On the second day, however, if the part be viewed with a lens, there generally appears an orange-coloured stain around the incision, while on the 4th or 5th day the part is hard, slightly inflamed, and itches, and a vesicle containing serum is formed on it. About the 6th day some pains and stiffness are felt in the axilla, symptoms which foretell the near approach of the fever and the favourable progress of the disease. On the 7th day the vesicle becomes more developed, and the red areola forms round its base.

The operation having now been performed seven, eight, or nine days, the usual period of latency of the poison, and the vesicle having existed four days, the ordinary symptoms of primary fever appear. This fever lasts three or four days, when the general eruption follows, now called the secondary eruption, the pustules coming out, as usual, in three successive crops, or on the face, trunk, and lower extremities. On the day of the general eruption the primary pustule, says Dr. Gregory, is distended with matter, and so proceeds on its course that it has scabbed when the secondary eruption is only about to maturate.

The most remarkable laws, however, of the inoculated small-pox are the singular mildness of the fever and the diminished number of the pustules of the secondary eruption. The mildness of the fever is thus instanced by the late Dr. Watson, of the London Foundling Hospital: "Of the seventy-four persons whose histories I have related, though inoculated with variolous matter in different states, although prepared in so different a manner, and a great number not otherwise prepared than by an abstinence from animal food, not one of them were disordered enough during the whole progress to occasion the least anxiety for the event; not one them had, from the pustules being upon the eye or near them, their eyes closed a single day; none continued in bed an hour longer than they would have done in their best health."

The number of pustules is subject to great varieties, but, with very few exceptions, it is much less than in the natural small-pox. In some cases not more than two or three appear, occasionally only the primary pustule is seen; but more generally the number varies from ten to two hundred, the mean being thirty or forty. Such is the general course of the inoculated small-pox. In a few instances, however, the disease that follows this operation is extremely severe, and in a still smaller number it is confluent: and in either case the patient is perhaps destroyed. Many theories have been invented to explain the singular mildness of the inoculated small-pox, but none of them are satisfactory.

Diagnosis.—It is not possible to distinguish the primary fever of small-pox from that incident to the other exanthemata, or from the first stage of continued fever. In the adult, however, the muscular pains are more severe, and in children there is a more frequent occurrence of convulsions.

The small-pox eruption, on its first appearance, is with difficulty distinguished from the varicellæ; but after a few hours its characters are so strongly marked that nobody who has seen the two diseases can confound them.

Prognosis.—The prognosis of the natural small-pox is always most grave. The calculation of the proportionate number of deaths, however, appears to have greatly varied in different years. It was formerly supposed that one in five or six attacked perished. In the present day, when the adult is almost its only victim, the records of the Small-Pox Hospital show that the loss has averaged thirty per cent., the extremes in different years being eighteen and forty-one per cent. In the epidemic of 1838,—

OF UNPROTECTED.

	Admissions	Deaths.
Of Confluent Small-pox . .	295	149
Semi-confluent	78	8
Distinct	19	0
Total . .	392	157

OF VACCINATED.

	Admissions	Deaths.
Of Confluent Small-pox . .	56	21
Semi-confluent	42	4
Distinct	20	0
Total . .	118	25

Sydenham considered the eighth, eleventh, fourteenth, and seventeenth days were the most fatal. Dr. Gregory has given us the number of deaths that took place on each day of the eruption; in 168 fatal cases,—

First Week.	Deaths.	Second Week.	Deaths.
3rd Day . .	1	8th Day . .	27
4th ,, . .	5	9th ,, . .	15
5th ,, . .	10	10th ,, . .	14
6th ,, . .	5	11th ,, . .	16
7th ,, . .	11	12th ,, . .	11
		13th ,, . .	11
Total .	32	14th ,, . .	5
		Total .	99

Third Week.	Deaths.	Fourth Week.	Deaths.
15th Day	7	22nd Day	3
16th ,,	5	23rd ,,	1
17th ,,	3	24th ,,	3
18th ,,	3	25th ,,	1
19th ,,	1	27th ,,	1
20th ,,	2	28th ,,	1
		Fifth Week.	
Total	21	29th ,,	1
		31st ,,	1
		32nd ,,	1
		35th ,,	1
		38th ,,	2
		Total	16

In general about one in three die from confluent natural small-pox; one in ten of distinct natural small-pox; and one to three per cent. only of small-pox after inoculation or after vaccination.

Treatment.—It is admitted that no medicinal antidote exists to this poison, and consequently the rule of treatment is merely to combat adverse symptoms. As the loss in small-pox from the primary fever is extremely small, little more is necessary to be done during this stage than to keep the bowels open and to exhibit saline medicines. When convulsions occur, as they frequently do in children, Sydenham and Cullen recommend, in preference to all other treatment, a cordial and a slight opiate. In the second stage, as the fever subsides as soon as the eruption appears, and as the pulse is now quiet, and no symptom of any moment exists, there seems no reason to alter the preceding treatment.

At the commencement of the third stage, or on the eighth day in the distinct and the eleventh day in the confluent small-pox, a formidable and too often fatal crisis occurs in the establishment of the secondary fever. The treatment of this crisis, it will be seen, from the deaths from confluent small-pox at the Small-Pox Hospital having been in 1838 more than one-half of the whole number treated, must be most unsatisfactory. Some physicians have bled, some have purged, some have given wine, and others have given bark; and all have had to boast of the recovery of some patients, but the ultimate loss has been nearly the same under every practice. In general, in slight cases, the treatment of this stage may be trusted to mineral acids, as the infusion of roses with ♏ v. to ♏ x. of dilute sulphuric acid; while, in severe cases, the practice of Sydenham, still perhaps the best, should be adopted. His directions are,—“ I order ten to twelve ounces of blood to be immediately taken away from that arm which has the fewest eruptions, and in which the vein therefore may be the most commodiously opened, and an opiate to be given in a large dose in the evening; and it is to be repeated morning and night from this time, and for some time oftener.” The exhibition of an opiate is insisted upon in other parts of his works as an essential part of the treatment, for he says,—“ It appears to me that opiates are as much indicated in the confluent small-pox as any particular remedy in any other disease, being a kind of *specific* here, as the bark in intermittent.”

In the course of the disease gargles will be found very grateful to those patients whose buccal membrane is affected with the eruption. The patient also often suffers from severe pains of the legs, and this is best met by warm fomentations, or by putting the feet in warm water with or without the addition of a decoction of poppy-heads. The sequelæ of the disease, as sloughing sores, abscesses, &c., are to be treated by poultices and the ordinary rules of surgery; but, at the same time, the patient must be supported by a generous diet and by tonic medicines.

In India it is the practice to employ cold affusion throughout the disease; but Dr. Currie gives two cases in which he tried this practice, but they both died; and Rayer speaks of its aggravating the pulmonary symptoms. Other practitioners speak of enveloping the whole body in one immense cataplasm, and, it is said, with some success. Others have recommended the opening the pustules, and, by letting out the matter, thus prevent the secondary fever; but Huxham says, “ a mortification is sometimes brought on” by this practice. Others have destroyed the pustule by caustic to prevent pitting, but it is generally determined that a worse cicatrix follows than if the cure were committed to nature.

The treatment of the affections of the eye is still most unsatisfactory; for the sight has been often lost when bark has been exhibited, while bleeding has not been more successful in stopping the ulcerous progress; and when we find 11 persons out of 26 have gone blind at the small-pox hospital, it is evident the local treatment of this disorder is not more advanced.

Dietetic and General Treatment.—The diet of the patient throughout the whole course of the disease should be strictly limited to slops, sago, arrow-root, and ripe fruits.

The chamber in which the patient lies should be cool, and freely ventilated. The bed-clothes should be light; the body-linen daily changed; and, when the disease is long, the patient's back should be often examined to prevent sloughing. The scalp likewise should be examined, and, if full of pustules, the hair should be cut off to prevent its matting.

There are no measures that can be relied on for preventing the spread of the disease; and if any susceptible person has been exposed to the infection, he ought immediately to be vaccinated; or, if vaccine matter cannot be obtained, he should be immediately inoculated, and in either case a mild disease will ensue.

Of the Poison of the Varicella—*Chicken-Pox, Swine-Pox, the Hive-Pox.*

The varicella is a disease consisting of fever and of an eruption, which generally runs a given course of eight or ten days. The poison exhausts the susceptibility of the patient, on the first attack, to its future actions. The name of this eruption indicates that it was for a long time considered, if not variolæ, at least of the same family. It is dissimilar, however, to that affection in the mildness of its character, in the shortness in its course, and in its failing to give any protection against the small-pox. No death from the varicella is recorded by the registrar-general as occurring in England or Wales during the year 1839.

Remote Causes.—The origin of this poison is entirely unknown, as also whether it is of primary or secondary formation; but it is probably the latter, being principally mentioned by the writers on small-pox.

Predisposing Causes.—This disease is of so little moment, that its predisposing causes have not been studied. It is, however, for the most part peculiar to childhood and early adult age. The disease, once engendered, is both contagious and infectious.

Infectious.—The evidence of the infectious nature of the varicella is the same as that of the other exanthemata, or the spread of the disease in schools and families.

Infecting Distance.—The distance to which the poison may extend, when diffused through the atmosphere so as to induce the disease, is not determined, but it is not so infectious as the small-pox, scarlet fever, or measles, for, when it breaks out, its extension is easily controlled. The infectious spread of the varicellous miasmata is, therefore, probably inconsiderable.

Contagious.—The contagious nature of this disease has been frequently proved by direct inoculation; and several cases of its being communicated in this manner are given by Willan.

Fomites.—The propagation of the varicellæ by inoculation is a proof of the contagion *per fomitem.*

Susceptibility exhausted.—This disease, as a general principle, affects the system but once, and the exceptions to this law are not numerous.

Co-exists.—The varicella may co-exist with the cow-pox, the small-pox, and perhaps with many other morbid poisons.

Modes of Absorption.—The varicella being contagious and infectious, the poison is of necessity absorbed, both by the cutaneous and mucous tissues.

Period of Latency.—The period of latency of the poison, in two cases inoculated by Willan, was thirteen days in the one, and fourteen days in the other. In a third case, inoculated by Mr. Wachsel, the arm began to rise on the third day. The period of latency of the poison in the natural varicella is not determined, but it seems to be a law of eruptive diseases that the period is shorter when the poison is introduced by inoculation than when it is absorbed by the mucous membranes.

Pathology.—The theory of this disease is, that a poison is absorbed and infects the blood, and after a given period of latency gives rise to primary fever, which lasts from twenty-four to seventy-two hours, when the eruption appears and runs a course of eight or ten days. The fever is much mitigated on the appearance of the eruption, and entirely subsides with it.

The law that fever precedes the eruption is so generally received, that no exception is to be found in any writer. The febrile affection is of a mild character, and though for a few hours it may be severe, yet perhaps it never passes into a brown-tongue stage. The eruption has three stages,—that of varus, of vesicle, and of incrustation; and after the fever has lasted from twenty-four to seventy-two hours, a number of red papulæ, or vari, appear, which become vesicular, and perhaps in a few points pustular, on the first day. On the second day the vesicles are *umbilicated,* and filled with a whitish or straw-coloured lymph. On the third and fourth days they attain their greatest magnitude, when the central bride ruptures, and they become *acuminated,* and shortly after they burst and shrivel, except those which contain purulent matter, and have much inflammation around their base. The fifth day they begin to crust, and in four or five days more the crusts fall off, leaving for a time red spots on the skin, generally without, but sometimes with, a "pit" or depression. The "pit" is permanent, and the cicatrix generally whiter than the original tissue, and the patient consequently is marked or scarred.

The eruption is not at first universal over the body, but usually consists of a series of crops, which succeed each other at intervals of 24 hours, and die away in the order of their occurrence. The first crop usually appears on the breast and back, and afterwards on the face and extremities. The number of crops may be limited to two or three, while, in other cases, a new succession will appear every 24 hours for 10 or 12 days.

Symptoms.—Of the varicella there are three kinds, or the varicella lenticularis, the varicella coniformis, and the varicella globosa,—the first being usually termed the swine or hive-pox, and the two latter, chicken-pox. The symptoms of their varieties are similar to each other; their only differences consisting in the size and form of the vesicle, that of the varicella globosa being the largest.

The fever which precedes this eruption is often as severe as that which precedes a mild small-pox or the measles, but it generally, though not constantly, remits on the appearance of the eruption, and does not return as it ripens. Dr. Willan mentions its having been accompanied in some few cases by angina, but how far this is accidental has not been determined.

Diagnosis.—The varicella, of whatever kind, is distinguished from the small-pox by the shortness of the primary fever, by the rapid course of the eruption, and by the greater number of the crops.

Prognosis.—In all cases favourable.

The Treatment consists in abstaining from animal food, in adopting a milk diet, and in paying attention to the bowels.

As this disease is extremely mild, it is better perhaps not to separate the children when it breaks out in a school.

Of Erysipelas.

Erysipelas is an inflammation of the skin, and very commonly of the cellular tissue, and is for the most part preceded or accompanied by fever. The duration of this disease is very various; it may terminate in a few hours, or it may last many weeks.

This disease is treated of by almost every writer, medical or surgical, from the time of Hippocrates; but there is no circumstance connected with its history that would justify particular mention in an elementary treatise. There died 1140 persons in England and Wales of this complaint in 1839.

Remote Cause.—The mystery which hangs over the origin of poisons is seen in a remarkable degree in erysipelas; for this disease is at all times sporadic, sometimes epidemic, and so far it would appear that the poison was derived from, and was constantly present, in the atmosphere. If, however, the doctrine of a spontaneous generation of a poison by the human body be tenable, it is more probably true of erysipelas than of any other disease; for it often happens that the slightest puncture, the opening of a vein, the bite of a leech, or the drawing of a blister, will produce this inflammation; and the disease thus produced has often been found dangerous and contagious, and consequently, if this poison has an atmospheric origin, slight causes often lay the patient under its influence.

Predisposing Causes.—The predisposing causes are age, mechanical or chemical injuries, as blows or burns; also certain articles of diet, as muscles or periwinkles, and many diseases likewise, as dropsy, typhus fever, or other debilitating cause. The effects of age in predisposing to this disease are considerable. New-born children, for instance, are occasionally subject to it, but from that period to adult age it is seldom witnessed.

The period of life most subject to acute attacks is from 20 to 40, and to chronic attacks from 40 to old age. Both sexes suffer in nearly equal proportions.

This disease being once produced is both infectious and contagious.

Infectious.—The spread of erysipelas has been so frequently observed, both in the sick-room and in the wards of hospitals, that no doubt can exist of this disease being infectious, and the following are instances of it. In the year 1760, this disease spread so extensively through the wards of St. Thomas's Hospital, that a report got abroad that the plague was in the hospital. Dr. Baillie has seen it spread in St. George's Hospital, and Dr. Cullen in the hospital at Edinburgh. It has also been found to spread extensively on board ship; and Dr. Wells, Dr. Watson, and others, have given several remarkable instances of its spreading in families.

Infecting Distance.—The infecting distance is considerable. The wards of St. Thomas's Hospital are 28 feet wide, yet the disease has been observed to spread on the admission of a patient labouring under erysipelas from one side of the ward to the other,

Contagious.—Dr. Willan says, if a person be inoculated with the fluid contained in the phlyctenæ or vesicles of a genuine erysipelas, that a red painful diffused swelling and inflammation analogous to erysipelas is produced. The danger, however, attending this experiment has not allowed it to be repeated. Erysipelas also spreads by *fomites*.

Fomites.—In St. Thomas's Hospital a ward has occasionally been obliged to be cleared out to stop the continued spread of erysipelas. In the navy the spread by fomites is so well understood, that it is even debated whether the swabbing the decks or dry-rubbing them is the best mode of disinfecting the ship, and preventing the spread of the disease. This disease also spread extensively, and for a long time, in the Birmingham Hospital, and was at last only got rid of by dry-rubbing, washing the wards appearing to promote its extension.

Susceptibility exhausted.—The patient having passed through this illness, has no security against future attacks of this poison, for many persons suffer repeatedly from erysipelas.

Co-exists.—The contagion of erysipelas is capable of co-existing with many other poisons. We continually observe erysipelas, for instance, co-existing with the primary as well as with the secondary symptoms of syphilis, and also with typhus fever. It was formerly not an unfrequent accompaniment of small-pox.

Modes of Absorption.—It is evident this poison, being both infectious and contagious, must be absorbed both by the mucous and cutaneous tissues, and probably infects the blood.

Period of Latency.—This disease has occasionally followed a few hours after exposure to the infection. Dr. Elliotson thinks five days elapsed in his own case, and Dr. Watson has given three cases in which the interval was a week. An instance occurred at St. Thomas's Hospital, in which a fortnight elapsed after its subsiding in one case and appearing in another in the same ward. It is probable, therefore, the period varies from two to fourteen days.

Pathology.—The theory of this disease is, that a poison is absorbed and infects the blood, and that after a given period of latency it produces generally, but not constantly, the phenomena of fever, which sometimes terminates in inflammation of the membranes of the brain. The great specific actions of the poison, however, are inflammation of the skin and subcutaneous cellular tissue, which runs an indefinite course.

The law that the poison occasions primary fever has many exceptions, especially in traumatic erysipelas from slight wounds, as leech-bites, or trifling punctures, as of a dropsical leg or scrotum. Idiopathic erysipelas is however very constantly preceded by fever, or, according to Frank, 18 times out of 20.

The law that the specific action of the poison is on the skin and cellular tissue has no exception. The affection of the cellular tissue may be trifling, but it is seldom altogether wanting.

The pathological phenomena which result from the action of the poison on the skin, are first, that the cutis is diffusely inflamed, the affected part being either of a bright scarlet or a rose-coloured tint, evanescent on pressure, but returning on that pressure being removed. This inflammation is usually of great extent, occupying very commonly the whole face, head, and neck, or a considerable portion of the trunk, or one or both lower or upper extremities. It runs a course extremely indefinite, as it may subside in a few hours, or continue for many weeks.

This inflammation of the skin may terminate by resolution, by vesication, or by gangrene. When it terminates by resolution, the rose-tint gradually changes to a deeper and more venous hue, and at length fades away, leaving the skin of its natural colour, but with the texture so impaired that desquamation follows. If the inflammation terminates in vesication, the cuticle is raised into a number of vesicles of greater or less size, and sometimes into large bullæ or bladders containing a yellowish transparent serum. The cuticle at length ruptures, the fluid is discharged, and a crust sometimes forms, which, on falling off, leaves the skin underneath either sound or else superficially ulcerated. Should the termination be by gangrene, the skin becomes livid or black, its whole texture more or less disorganized, while the bullæ or phlyctenæ which often form in these cases are filled with a bloody serum. The cutis, when examined after death, whatever may have been the form of the disease, is always found greatly thickened and infiltrated, but the redness, except in cases of gangrene, has entirely disappeared, the action of the capillary system long surviving that of the larger blood-vessels.

It is seldom that erysipelas is limited to a simple affection of the skin, for more commonly at some period of the disease the corresponding portion of the cellular tissue becomes the seat either of serous, adhesive, suppurative, or of gangrenous inflammation. When the termination is by effusion of serum, the quantity of fluid effused is generally so considerable that the head, face, or limb, is greatly and sometimes even hideously swollen; and if the part be now incised, the vessels are seen enlarged and more numerous than usual, and the cellular tissue loaded with serum, sometimes turbid and flaky. The tissue is also more easily torn than usual. This inflammation may terminate by absorption of the serum, but in a few cases ulceration follows, and in a few others gangrene.

Adhesive inflammation, or a deposit of lymph, seldom takes place in erysipelas without its being accompanied by the serous or the suppurative inflammation. When the patient, for example, has died from erysipelas of the head, much loose watery lymph is usually found in the teguments of the scalp or other affected part. The lymph thus thrown out, however, often becomes organized in this disease, causing a joint to be bound down, and its motions to be impaired, or an eyelid to be either inverted or everted.

Suppurative inflammation is uniformly preceded by serous inflammation, and the result may be the formation of an abscess, or what is much more common, pus may be *infiltrated* through the cellular tissue uncircumscribed by any adhesive inflammation, a circumstance improperly considered by many pathologists as pathognomic of erysipelas. The parts more usually the seat of phlegmonous circumscribed abscess are the eyelids, and the integuments covering the cheek-bones, and the pus in these cases is usually of a laudable and healthy character. In all other parts of the body the abscess is diffuse, and the inflammation being of a low type the pus is poor, and often little more than a fœtid sanies; and should the parts slough, it becomes loaded perhaps with a dirty broken-down cellular tissue, generally mixed with some loose lymph. In some instances the suppurative process extends between the muscles, causing extensive and often irreparable mischief. In the event of this inflammation terminating by gangrene, the integuments of an entire limb are sometimes detached, laying bare the muscles, a large artery, or a bone, involving the aponeuroses and tendons, and sometimes destroying the interior of a joint. Gangrene, however, does not equally take place in all parts, for it is seldom seen on the scalp, the face, or the trunk. It is the extremities, then, and more especially the leg and thigh, and also the labia and scrotum, that more particularly suffer from this affection.

The appearances found within the cranium are similar to those found in typhus fever. In a few instances the mucous membrane of the intestinal canal has been found inflamed or ulcerated, but not so frequently as to be attributable to an action of the poison.

Symptoms.—The symptoms of erysipelas arise out of the fever and local affection, and give rise to three degrees of intensity, or to erysipelas mitior, erysipelas gravior, and to erysipelas gangrenosum; and these may be acute or chronic.

In acute cases of erysipelas, the erysipelatous inflammation is generally preceded or accompanied by fever; and the attack may be sudden, or else ushered in by rigors, irregular flushings, muscular pains, accelerated pulse, white tongue, nausea, vomiting, and deranged bowels. These symptoms, when they do exist, last for some hours, perhaps till the end of the second night or beginning of the third day, when the fever becomes continued, and shortly afterwards the cutaneous inflammation appears, but without any remission of the fever.

The stages of erysipelatous fever are usually but not necessarily three in number. The first stage is marked by a white tongue, by headache, oftentimes by delirium, and by a pulse varying from 90 to 110; and this stage, if the disease be mild, may constitute the whole disease, the tongue not passing into the brown state. More commonly, however, the fever proceeds, and about the fourth, fifth, or sixth day the tongue becomes brown and dry, the temperature falls perhaps to the natural standard, but the pulse rises to 120 to 140; and the active delirium changing to a low muttering with subsultus, marks the formidable second stage of this dangerous disease. This stage is often extremely rapid, sometimes not lasting more than a few hours, or at most three or four days, when the third stage commences; and if the termination be favourable, the tongue begins to clean, the pulse becomes slower, the delirium subsides, and the patient rapidly recovers; or else, on the contrary, if the disease takes an adverse turn, fatal symptoms fast gather around the patient, and the catastrophe is death.

The whole duration of this fever is generally much shorter than that of typhus; so that in idiopathic erysipelas the three stages are often concluded in the space of five, six, or seven days, and it is only in a few cases prolonged to the fourteenth or twenty-first day. If, however, the local inflammation terminates in sloughing or gangrene, the patient may fall into hectic, and the disease may now last for many weeks or even months. When the local inflammation precedes the fever, as in erysipelas from dropsy, the white-tongue stage may be wanting, the tongue becoming brown in a few hours; and under these circumstances, should gangrene follow, the patient is irrecoverably lost.

The *local* symptoms vary according to the part affected, the mode of termination of the inflammation, and also according to the character and duration of the fever.

When erysipelatous inflammation affects the face, it may begin either in the skin, or else in the subjacent cellular tissue. If the cellular tissue be primarily affected, the face at the inflamed part becomes swollen, but the skin suffers no discoloration for some hours, so that it is impossible to distinguish it from an ordinary attack of swelled face. At length, however, the skin inflames, and the part is now red, hot, and painful as well as swollen, and the disease is fully formed.

At the commencement of erysipelas of the face, the attack is usually partial, and perhaps limited to the bridge of the nose, to one ear, to the lower eyelids, or to one cheek; but in severe cases it gradually extends, often involving the whole of the integuments of the face, head, and neck; so that at the end of three or four days those parts present a strangely swollen, disfigured, and even in some instances, hideous appearance, scarcely a feature being discernible. The nostril, moreover, is imperforate from internal swelling, so that the patient is obliged to breathe with his mouth open, while the inflammation may extend to the auditory passage, and render the patient completely deaf.

On the fourth, sixth, eighth, or some later day, the bright-red colour of the skin changes to a deeper hue; the serum effused is absorbed, and desquamation taking place, the skin gradually returns to its natural colour. It is not unusual, however, for abscesses to form, particularly on the eyelids or cheeks, and which being opened quickly, heal, and hardly retard the convalescence of the patient. In some cases the disease becomes *erratic*, and extends over the chest or down the back, and desquamation is seen going on in one part while the erysipelas is spreading in another.

The trunk is occasionally the seat of this disease; and in this case the febrile affection is less violent in the first stage than in inflammation of the face; but in the second stage it is often much longer and of a lower type, so that the whole duration of the disease is increased, and perhaps the termination more constantly fatal. The inflammation more frequently attacks the lower than the upper portion of the trunk, and more frequently the back than the abdomen. It has also a greater tendency to become erratic than similar affections of the face; and when, as it often does, it terminates in effusion of pus among the muscles, the patient seldom recovers.

The extremities are more commonly the seat of erysipelatous inflammation than the trunk, and the lower extremities are more frequently affected than the upper. When these parts are affected, the fever is less severe than in erysipelas of the head; but the local symptoms are generally more formidable, for the degree of heat is greater and the pain so severe, that the weight of a sheet can hardly be borne. The inflammation likewise often involves the lymphatic vessels and glands, which can now be traced by white or red lines for many inches, as from the knee or elbow to the inguinal or axillary glands, which sometimes enlarge and suppurate. If the erysipelatous inflammation ends in suppuration, the abscess is always diffuse, and the swollen limb gives a peculiar sensation to the hand, and which has been compared to what a person feels on passing over a quagmire. The dark, black, discoloured appearances of gangrene are too obvious to render any description of the parts so affected necessary.

Diagnosis.—The diagnosis of erysipelas is in general easy. For a few hours, perhaps, if a joint be attacked, it may be mistaken for acute rheumatism; or if a surface be attacked, it may be confounded for a short time with erythema, but the intumescence and spread of the disease quickly enable us to rectify the error.

Prognosis.—This disease is so influenced by treatment that it is difficult to estimate the proportion of deaths to recoveries. Some practitioners give as a result one death in three; while others affirm it to be only as one in ten, or even a much larger number.

Treatment.—Broussais states, that when he served with the French armies in Italy, he has seen erysipelas, for want of medicine, allowed to run its natural course, and that the result was, it made immensely rapid progress, and ended either in suppuration, in gangrene, or in fatal visceral inflammation. Some mode of treatment is therefore imperatively necessary to control this too often fatal disease, and it is to be regretted that the profession are not as yet unanimous as to the means to be adopted.

Erysipelas is admitted to be a highly inflammatory disease; and in the opinion of one party it is a disease of simple inflammation, and consequently ought, like the other phlegmasiæ, to be treated by general and local bleeding; while on the contrary, the opposite party contend that it is a specific inflammation, and that a long experience has shown that bleeding is often injurious, and that a tonic mode of treatment is much more uniformly successful.

There are very few physicians, from the days of Hippocrates to the present time, who have not bled in erysipelas, and consequently this experiment has been made on a large scale; still many of the warmest advocates of bleeding allow that operation to be occasionally followed by many unpleasant consequences. Mr. Lawrence, for example, speaks of having obtained much success by this treatment; but in seven cases of idiopathic erysipelas which he details, and in which bleeding was adopted, in one he was obliged to have recourse to bark; while in another the disease ran on from April to August. He also gives seven cases of traumatic erysipelas, which he likewise treated by copious general and local bleeding, but with so little success that he was in all of them driven to the unhappy necessity of making his long incisions on account of suppuration taking place.

In France, Dupuytren also adopted a similar treatment, in the belief that erysipelas was a disease of simple inflammation, and that energetic bleeding was necessary to subdue it. He gives five cases; and of these, two died; a third party lost the use of a limb; while in a fourth, the disease, notwithstanding the treatment, continued to spread; and the fifth only appears to have entirely recovered.

The treatment by bleeding, it has been seen, has been often followed by so many unfavourable exceptions, that many physicians, the most intelligent of the profession, affirm that, according to their experience, that practice is not only unfavourable but highly injurious. Andral is reported to have said, "in erysipelas with delirium bleeding pales the skin, but the disease continues; the cellular tissue remains gorged, and death follows. We open the body but find nothing." Cruveilhier says, "*des erysipèles rentrés*" is a consequence of unusual or too abundant bleeding, and he considers the question of bleeding, in this disease, to have been "*depuis longtemps jugée.*" Blache and Chomel likewise say that "experience has proved that general bleeding has no other effect than to blanch the eruption without notably abridging its duration." In this country, Drs. Fordyce, Wells, Pearson, Heberden, and Willan all give their testimony to the frequent ill effects of bleeding in this disease; and, in consequence, they, for the most part, recommend a tonic treatment, or by bark; and many practitioners have gone so far as to affirm that bark is a specific for this formidable disease. There seems no reason, however, for considering bark to be a specific for erysipelas, though a highly useful adjuvant, for it seldom favourably influences the disease till the tongue becomes brown and dry, and the patient consequently reduced to a state of much danger. Indeed, a long experience in the wards of St. Thomas's Hospital has rendered it probable that a treatment by wine is much superior to that by quinine or bark, and greatly so as a general principle to that of bleeding. The mode, then, of treating acute idiopathic erysipelas, whatever be the part affected, and with whatever symptoms accompanied, is to put the patient at once on a milk diet, to open his bowels, and to exhibit 4, 6, or 8 ounces of wine diluted with water, or with sago, or arrow-root, in the 24 hours, according to the severity of the symptoms. This mode of treatment cannot be instituted too soon, and it is seldom necessary to vary it throughout the whole course of the disease; for the delirium, if present, is generally tranquillized, or, if absent, prevented; the tongue, also, more rarely becomes brown, or only continues so for a few hours, while the local disease seldom passes into suppuration or gangrene. In a word, all the symptoms are mitigated and the course of the disease shortened. In a very few cases, however, something more is necessary to be done, and then quinine, gr. j. to iij., may be given with great advantage in very severe cases every four or six hours; and again, a few apparently hopeless cases have been saved by a drachm of quina in half-a-pint of barley water thrown up as an enema every night. In very mild cases, as in erysipelas after leech-bites, the disease may be in a great measure left to itself, or be treated by some slight purgative, to which it readily yields. Many other methods of treatment have been recommended, as by tartarized antimony, purging, &c.; but these modes do not appear to have been by any means generally successful.

The general treatment is, by most practitioners, accompanied by some *local* treatment, as blisters, poultices, fomentations, cold lotions, the application of mercurial ointment, drawing a line of limitation with lunar caustic, punctures with the lancet, the application of leeches, and large incisions through the integuments and down to the fascia. The value, however, of any or of all of these auxiliaries in idiopathic erysipelas is extremely doubtful; for even the most simple, and apparently the most applicable, or cold lotions, are supposed by Cullen and many other close observers to favour the formation of pus.

The treatment of the part, after suppuration has taken place, is a free opening, poultices, and the ordinary rules of surgical treatment.

Dietetic and preventative Treatment.— It is essentially necessary that the patient should be restricted to a farinaceous diet and to slops till he is decidedly convalescent. The preventative measures are cleanliness, separation, and ventilation; and the attendants should be cautioned of the great probability of their contracting this disease in the event of any contravention of these rules.

Of Hooping-Cough.—*Pertussis.*

Hooping-cough is a disease in which the poison produces a slight catarrhal fever followed by a peculiar paroxysmal cough.

The origin of hooping-cough appears to be of no distant date, Sprengel not having been able to trace it beyond 1510, when it was endemic in Paris; but its epidemic character was not determined till 1580, when it destroyed a prodigious number of children throughout Europe. This disease prevails now all over the world, or from the North Pole to New Holland. It is of much fatality, 8165 persons having died of this disease in 1839 in England and Wales. This poison, like that of the exanthemata, has the property of exhausting the susceptibility of the patient to its future actions on the first attack.

Remote Cause.—The fact of the susceptibility to this disease being exhausted on the first attack is a sufficient proof of the hooping-cough being caused by a particular agent; but in what manner this agent is generated is not determined. This disease is always sporadic, sometimes epidemic. The reports of the registrar-general for the year 1839 show that 1674 died in the winter quarter, 1208 in the spring quarter, 644 in the summer quarter, and 787 in the autumnal quarter; but the returns at present are too few to allow us to determine whether this ratio as to season be constant. The poison has probably a telluric origin.

Predisposing Causes. — The predisposition to this disease is so strong that few persons pass the period of childhood without suffering from it; but it may occur at any subsequent age. The early age at which the large majority of patients pass through the disease is, however, a sufficient reason for our very slight acquaintance with the predisposing causes.

When the hooping-cough is once excited, the patient's person secretes a poison which is both infectious and contagious.

Infectious.—The public are unanimously of opinion that hooping-cough is infectious, and no parent will permit his yet unaffected child to mingle with such as may be labouring under the disease. The profession, also, are, with a few exceptions, of the same opinion. It is supposed to have been first introduced into Van Diemen's land by a female prisoner, and subsequently to have spread both to the settlers and natives.

The infecting *distance* of this poison must be considerable, from the utter impossibility of isolating the little patient at home, or of preventing the spread of the disease in schools and asylums

Contagious. — Since no cutaneous eruption accompanies this affection, the fact of its contagious nature cannot, as in the exanthemata, be strictly demonstrated. The communication, however, of this disease by *fomites* is an *a fortiori* proof this law.

Fomites.—Rosen conceives that, without being aware of it, he has often carried the disease from house to house. Frank also says it is often propagated from patient to patient, from house to house, and from village to village. Lombard says, that in Geneva, he has often traced the first cases occurring in that city to a neighbouring town, or to a sick child from the country. It was some years ago introduced into St. Helena, where it proved greatly fatal, the captain of a ship having some children labouring under hooping-cough on board having been allowed to send their dirty linen on shore to be washed.

Susceptibility exhausted.—The hooping-cough, as a general principle, affects the same person but once, and the exceptions to it are exceedingly few. Blache, however, gives a remarkable instance of a grandfather and grandmother catching it a second time from their grandchild, and all of them labouring under the disease together.

Co-exists.—The poison of the hooping-cough may co-exist with many other poisons, and in this case they often greatly influence each other's actions. The small-pox and hooping-cough have often co-existed; and a very common and fatal combination is measles and hooping-cough. Hooping-cough and cow-pox is not unfrequent. Indeed, the lower classes look upon vaccination as, in many instances, a cure for the hooping-cough.

Modes of Absorption.—If the law be established, that the hooping-cough is both contagious and infectious, it follows that the poison must be absorbed both by the mucous membranes and by the cutaneous tissue.

Period of Latency.—Our knowledge of this fact is at present extremely imperfect, but the more received opinion is, that the period of latency is about five or six days.

Pathology.—The theory of this disease is, that the poison produces slight primary fever, which for the most part subsides on the specific or secondary actions being set up, which are disordered actions of the pulmonary and gastric branches of the eighth pair, causing the peculiar cough and vomiting. It seems probable, also, that this poison has a tertiary action on the mucous membrane of the intestinal canal, and also on the substance and membranes of the brain.

The hooping-cough, in its earliest stage, is merely a disease of function, and often continues so throughout its whole course; for many cases have been examined in which no trace of inflammation, or other disease, has been discovered in any part of the body. If, however, the disease be of greater intensity, it very commonly produces structural disease of the lungs, stomach, intestinal canal, or of the membranes of the brain.

Rostan says, "I have examined some children that have died of this disease with great care, and I have constantly found alteration of structure of the respiratory organs. The most common of these alterations is peripneumony, either single or double, with pleurisy and catarrhal inflammation of the bronchial membrane." These facts being corroborated by every writer, there can be no question but that this poison acts on the pulmonary branch of the eighth pair.

Dr. Watt, on examining the body of his son, Robert Watt, found, "on laying open the stomach, the internal surface had numerous red streaks, the marks of inflammation. There was also an universal crust of exudation, and much of it was collected on the upper surface, and not owing to the position of the viscus." In two cases that died at the London Foundling Hospital, in addition to the usual inflammatory appearances of the lungs, the mucous membranes of the stomach were in each case singularly red and injected. Both stomachs, also, were filled with the glairy matter vomited up in the disease. This poison consequently acts on the gastric portion of the eighth pair.

With respect to the tertiary actions of the poison, we occasionally, on opening patients that have died of hooping-cough, find the glandulæ aggregatæ vel segregatæ considerably enlarged, a circumstance which can hardly be considered accidental, when Blache states it existed in five cases out of nine that he examined. It has been a question whether the cerebral symptoms were the result of the violence of the cough, or of a tertiary action of the poison, but the latter theory seems the most probable. The patient sometimes has died with formidable convulsions, and yet no alteration of texture been discoverable. When, however, lesions of structure do exist, the membranes are injected, and serum effused into their cavity, and into the lateral ventricles. The substance of the brain, also, has more puncta cruenta than usual, and some very limited portions are said to have been found softened.

Symptoms.—The symptoms of hooping-cough arise out of the previous fever, the cough, vomiting, and also the different inflammations with which it may be accompanied.

The law that fever precedes the cough, though generally true, has many exceptions; for the paroxysms of cough are often established, and more particularly in summer, without being preceded by any febrile phenomena. The severest attack, indeed, seldom confines the patient to his bed, so that it rarely exceeds that accompanying ordinary catarrh. Hooping-cough varies greatly in intensity, and is, therefore, divided into

Pertussis mitior and into *Pertussis gravior.*

Most authors divide the group of symptoms of hooping-cough into three stages. The first stage comprehends the period from the first symptoms of illness until the hoop confirms the nature of the cough. The second stage commences as soon as the nature of the cough is determined, till the violence of the cough and the danger of the inflammation be past. The third stage is the convalescence of the patient, until the final and happy termination of the disease, or else the occurrence of those symptoms which destroy the little sufferer.

First Stage.—The early symptoms of the hooping-cough, and more especially in the spring and fall, are those of a common cold—as hoarseness, sneezing, a watery discharge from the eyes and nose, much oppression of the chest, a short dry cough, and such fever and other derangement as usually attend an ordinary cold. This stage usually lasts from one to eight days, but Willan has estimated it from one to two or three weeks, and Lombard has extended it to six or eight weeks.

Second Stage.—It is not until the fever remits, and is about to pass away, that the cough, which had distressed the patient, is followed by the characteristic hoop. On the occurrence, however, of this symptom, the disease is fully formed, and now consists of a series of fits or paroxysms of severe coughing, which occur at uncertain periods, while, during the interval, the little patient often enjoys his usual health, recovers all his gaiety, returns to his play, and relishes his food with good appetite. A paroxysm, or fit of the hooping-cough, is as follows:—

The approach of the fit is often denoted by an unpleasant titillation of the glottis, by a sharp pain in the chest, or else by a spasmodic contraction of the diaphragm. As soon as the child is thus warned, he instinctively runs to his nurse, and either grasps her arms, or lays hold of her chair, to support himself during the paroxysm, which in a few minutes or a few seconds is about to follow. In severe cases the cough is quite convulsive, and so rapid is the action of the diaphragm, that the air is almost instantly expelled from the lungs, and the patient, half suffocated, turns black in the face, and frequently passes his urine. At length the crisis approaches, the diaphragm relaxes, and a violent inspiration follows, accompanied by the characteristic hoop. This sound perhaps remits, but after a few seconds returns; and thus convulsive inspirations and expirations continue, till the patient is at length relieved by a copious expectoration, or else by vomiting. The matters expectorated from the lungs are frequently thick, viscid, and muciform. When vomited from the stomach, the patient throws up a glairy fluid of much tenacity, semi-transparent, and frequently amounting to the greater part of a pint; and should he have recently eaten, the food often returns with it. It frequently happens, however, that the stomach, by a sort of election, retains the food, and rejects the offending matter. If the fit be violent, the fluid rushes not only from the mouth, but also from the nostrils; and in some instances is mixed with blood, for blood occasionally bursts in considerable quantities from the congested vessels of the mouth, the nostrils, the ears, the eyes, and in some instances also from the lower parts of the body.

If the stethescope be applied to the chest previous to the fit, we sometimes detect the mucous rhoncus, common to catarrh; yet in most cases the respiration is natural. During the act of coughing, the respiration is completely suspended, and not sensible to the ear in any part of the chest. On the hoop, however, taking place, the air is heard to rush with remarkable violence into the trachea; but at this point it stops for one or more seconds till the bronchial tubes relax, and the air is then admitted into the lungs.

The fit having subsided, the eyes, which had nearly started from their orbits, resume their natural position, but are inundated with tears, or else the conjunctiva is more or less gorged with blood: the natural expression and appearance of the countenance returns, and in a few minutes, in favourable cases, the good spirits of the little patient are renewed, and he eats with appetite. On the contrary, in severe or unfavourable cases, long-continued exhaustion, headache, and some fever, are the preludes to convulsions, inflammation, or the other severest forms of the disease.

The paroxysm varies greatly in frequency and severity, but in general its frequency is as its severity. In ordinary cases it returns every two hours, but in severer cases, and especially during the second and third week, it returns every half or every quarter of an hour, or even oftener. This disease commonly reaches its acmé at the end of the third, fourth, or fifth week; after which the paroxysms diminish in frequency, the intervals are prolonged, and the patient is to a certain degree convalescent. The duration of this second stage is from two to six or eight weeks.

Third Stage.—The third stage commences with the convalescence of the patient, when the paroxysms become milder, the intervals longer, the expectoration more natural and less in quantity, and the vomiting ceases, so that the general health of the patient is much improved. The duration of this stage, however, is often long and variable, and the cough may still harass the patient for many weeks, or even many months. It is to this stage that the term chronic is usually applied.

The whole duration of the stages of hooping-cough are liable to greater variations than in almost any other disease; for this complaint may terminate in two or three days, and after a very few paroxysms, or it may last two, three, or four months, or even more than a year. Lombard has given a calculation of the number of paroxysms of an ordinary attack, and he estimates them at three hundred and eighty-three day paroxysms, and four hundred and fourteen night paroxysms.

Such is the progress of an ordinary case of pertussis mitior, or as long as the disease is limited to mere neuroses of the parts affected; but in particular seasons, and in particular persons, many accidents may arise to complicate the symptoms, and to increase the danger, as inflammation of some of the tissues of the lungs, of the mucous membrane of the stomach or intestines, or of the serous membranes of the brain.

Inflammation of the mucous membrane of the bronchia is the most usual complication of the hooping-cough. The form of inflammation may be that in which the secretions are in defect, so that the mucus is not only greatly diminished in quantity, but is thick and viscid, teazing the patient with fruitless efforts to free it from the lung, and thus causing a frequent recurrence of the paroxysm. In other cases it may assume the form of purulent inflammation, the pus secreted being formed into sputa, and moderate in quantity or else it may be thrown up pure, as from an abscess, and so enormous in quantity as to amount to one or two pints in the twenty-four hours. The inflammation of the bronchial membrane may spread to the substance of the lungs, when the danger, as well as the symptoms of some of the various forms of pneumonia will be added to the disease; but the most formidable accident is when the pleura is inflamed, for then the patient's sufferings during the paroxysm are fearfully increased, from the agonizing pain inflicted during the paroxysm of the cough.

The mucous membrane of the stomach and intestines is also often the seat of inflammation; and this is denoted by pain in the epigastrium, and by the suppression of the glairy fluid thrown up by vomiting, so that on the termination of the fit the patient often lies in a state of complete exhaustion, unable to discharge anything either from the stomach or lungs, or even to hoop, and he is now said to labour under the *dumb kink*.

In mild cases the bowels are little affected in this disease, except that the patient sometimes passes his fæces during the paroxysm. In severe forms the stools are often either black and offensive, or else consist of a colourless mucus, the latter evidently depending on an inflamed state of the mucous follicles.

Headache is a symptom which usually attends the catarrhal stage, but generally ceases when the fever subsides. In some instances it continues throughout the disease, and is not unfrequently the forerunner of fatal convulsions, or epilepsy, or else of inflammation of the membranes of the brain, terminating in delirium, coma, hydrocephalus, and death.

Diagnosis.—It is impossible to determine whether the febricula of the first stage is the result of simple catarrh, or will, on its subsiding, prove to be hooping-cough. As soon, however, as the cough has been followed for two or three paroxysms by the hoop, the diagnosis is perfect, no other disease being accompanied by this symptom.

Prognosis.—The proportionate number of deaths to recoveries, in hooping-cough, is not determined, but it greatly varies in different years; for in one year, says Frank, hardly a death will occur from this cause in a large city, while in another year many children will fall. In general, however, pertussis mitior is rarely fatal, while pertussis gravior is very commonly so. Lombard thinks station in society greatly affects the mortality; for he says, and may fairly assert, that of ten fatal cases nine belong to the poorer classes. The reports of the registrar-general show that the mortality is greater from this disease in towns than in the country, being in the metropolis, in 1838, ·111 per cent., while in England and Wales it was only ·061. In the year 1839 also, it was for the metropolis ·061 per cent., while for England and Wales it was ·053. Lombard gives the ages of 40 fatal cases as follows:—

From birth to 6 months . .	6
,, 6 to 12 months . .	7
,, 1 to 2 years . .	10
,, 2 to 3 ditto . . .	6
,, 3 to 4 ditto . .	7
,, 4 to 5 ditto . . .	2
,, 5 to 6 ditto . . .	2
,, above 6 ditto . . .	0
	40

Treatment.—The stage of invasion is seldom marked by symptoms of greater severity than those of common catarrh, and consequently, except putting the patient on a low diet, and attending to his bowels, there is little occasion for medicine, especially as the diagnosis can hardly be said to be yet complete.

The hoop having confirmed the nature of the disease, and the second stage established, the disease will now run its course, and two indications of treatment present themselves. The first is to prevent, if possible, convulsions, or any attack of inflammation, either of the lungs, the stomach, or of the membranes of the brain. The second indication is, after the period of danger is past, to prescribe such medicines as may interrupt the course, and anticipate the time of the spontaneous cessation of the disease.

The best mode of obviating the danger of cerebral irritation, or of inflammation of any of the organs that have been mentioned, is to mitigate and control as far as possible, the frequency of the paroxysms, to check those secretions which are in excess, and to excite those which are in defect, and these objects are best obtained by mild opiates, combined with gentle purgatives or laxatives.

The choice of the opiate has been considered a matter of much importance. The continental physicians have bestowed much praise on belladonna, others on hemlock, others on henbane, while others have contented themselves with opium. It must be admitted, however, that neither of these narcotics possess any specific property in controlling this disease, so that the selection of the particular one must be left to the discretion of the practitioner. But supposing the patient to be a child, as the head is especially the organ to be protected, the mildest, as hyoscyamus, or the syrup of poppies, are the safest and best. Should, however, belladonna be selected, if the child be under 4 years of age, the dose ought not to exceed one-eighth of a grain; or if hyoscyamus, half a grain to a grain, every six or eight hours; while if it be the syrup of poppies, this medicine should be given in such fractional doses of a drachm as are suited to its age.

But an opiate, in the early stage of the disease, ought not to be administered alone, and some purgative or laxative ought, as a general rule, in all cases, to be combined with it. The selection of the particular medicine is perhaps unimportant, and any vegetable or saline purgative will perhaps answer equally well, as the confectio sennæ, rhubarb, or castor oil, or manna. The neutral salts, however, sit easiest on the stomach, and, as the medicine must be continued, are the most agreeable to the patient; and the best combination for children, perhaps, is syrupi papaveris c. magnesiæ sulph. āā ʒ ſs. to ʒ j. ex. mist. camphoræ 6^{tis} vel 8^{vis} horis. This prescription generally puts this disease in a safe train, and is, in many instances, all that is necessary to insure its termination in a moderate time.

Towards the close of the second stage the symptoms may, in a few instances, become unfavourable, and cerebral irritation, with convulsions, or inflammation of the membranes of the brain, of its substance, or of the tissues of the lung, or of the alimentary canal, may complicate the disease, and now the treatment of the case is always exceedingly difficult, and frequently unsuccessful.

If the convulsions should come on suddenly, and without headache, or other symptom of inflammatory action, small doses of any opiate, and mustard poultices to the feet, often relieve the patient; but should the convulsions still continue, an assafœtida injection may be thrown up. It often happens that the convulsions are combined with a suppression of the vomiting, and of the usual glairy discharge; and in these cases leeches, followed by a large linseed poultice, should be applied to the epigastrium. If the disease should proceed, and headache or other symptom show an affection of the membranes of the brain, leeches should be applied to the temples and cold to the head.

When the poison excites inflammation of the tissues or substance of the lungs, bleeding to a limited amount is imperatively required; but we should be satisfied with such mitigation of the symptoms as may obviate immediate danger, and even that is not always obtained, since the affection is not to be subdued by bleeding, as in simple inflammation, for, being dependent on the action of a morbid poison, it will run a given course. Blache, for instance, bled in nine cases, either with the lancet, by leeches, or by cupping, and in one case no less than five times; yet, he adds, with a desolating want of success, and eight out of the nine cases terminated fatally. This result makes him add an axiom, in which every practitioner will agree, that there is in severe hooping-cough, as in typhus, cholera, and many other affections, an unknown element which controls all these intercurrent inflammations.

If the intestinal canal be affected, some sharp purgative, combined perhaps with calomel, may be necessary, to act on the bowels and free them from their contents; and, if the stools be white and muciform, and the patient not relieved, an enlarged state of the follicles may be suspected, and consequently a large linseed poultice should cover the abdomen for some hours, preceded, perhaps, by an enema of syrup of poppies and barley-water, and which afterwards should be thrown up night and morning. Many other modes of treatment have been recommended for the cure of hooping-cough, and more especially a treatment by emetics repeated every second day; but, as the emetic is admitted to have no specific property, it seems difficult to understand how its action can be salutary, especially as in most instances the patient throws up, in a greater or less degree, after each paroxysm of coughing.

The disease having passed into the third stage, and the inflammation or other threatening symptom, if any has existed, having subsided, it is desirable to attempt to abridge the duration of the cough, which often extends to a most distressing length: and for this purpose tonics, anti-spasmodics, and other remedies, either external or internal, have been recommended.

The more stimulant anti-spasmodics, as assafœtida, musk, castor, oil of amber, cantharides, and camphor, are the remedies which have obtained the most suffrages in the cure of this stage of the hooping-cough. But the two first are most esteemed, and some persons even consider assafœtida to be a specific, not only in this, but in every other stage of the disease. Cullen, however, preferred cinchona to assafœtida, and considered it "the most certain means of curing the disease." Many other remedies have been mentioned, as alum, hydrocyanic acid, oxide of zinc, arsenic, and many preparations of iron, and all of these remedies have perhaps been found to a certain extent useful; but in estimating the results of remedies, however, we should be careful not to mistake recovery for cure.

When internal remedies have failed to make any impression on the hooping-cough, the cure is often attempted by means of local treatment, or by derivatives. The early physicians applied actual cautery to the nape of the neck; the modern ones, blisters to the spine, or have directed the back to be rubbed with the unguentum antimonii cum potassio tartarizati, or with some liniment or embrocation, as the linimentum camphoræ, linimentum ammoniæ, or with assafœtida, oil of amber, oil of turpentine, or the tincture of cantharides. The general opinion, however, is, that these do little good unless they contain some opiate, whose absorption they facilitate. Nevertheless, "*Ne crede tali auxilio*" is a truth, however, too often inculcated as the result of their employment. Foot baths and the warm bath have also been used, and often with much efficacy.

When ordinary remedies have failed a change of air is a resource of great value, and was first mentioned by Dr. Forbes, in his thesis *De Tussi Convulsivi*, in 1754; and since that period it has been recommended in dangerous cases by most physicians, with that praise it so eminently deserves. It is determined that a change from the bad air of a town to the purer air of the country is at all times of great benefit; but Lombard contends that he has found a change from the country to the town to be beneficial, and that the patient is benefited even by a removal of so short a distance as half a mile. Indeed, it is impossible to witness more striking instances of the advantages of treatment than we occasionally observe in patients when removed from London to the environs, for in a few hours they often recover from an apparently hopeless state.

Dietetic and General Treatment.—The patient should not be allowed animal food from the commencement almost to the termination of the disease. It is desirable also that the temperature of his apartment should be regulated, and that he should not be exposed to any considerable or sudden change from heat to cold. In mild weather also, if no local symptom forbids, he should be permitted to take exercise in the open air. He should likewise be recommended to wear flannel.

There are no known means of prevention, except an entire removal from every source of contagion.

Of the Cow-Pox—*Vaccinia.*

The cow-pox is a simply contagious disease, the poison producing a single vesicle at each point of puncture. No death from this cause is recorded in either of the reports of the registrar-general.

This poison is the only beneficent agent known in the whole range of morbid poisons; is immediately derived from the cow; and has the singular property of destroying the susceptibility of the human frame to the small-pox, the most virulent contagion we suffer from. Our knowledge of the anti-variolous properties of this poison is due unquestionably to Dr. Jenner, who introduced it into medicine in the year 1798. The necessity for such a remedy arose out of the circumstance, that notwithstanding the general safety of the patient by inoculation, still the time and expense necessary to enable him to undergo that operation were so considerable that a large portion of the population were altogether unprotected. The practice of inoculation consequently was only a means of more widely extending the disease; and it was calculated, from data submitted to a committee of the House of Commons, that for the fifty-five years preceding the introduction of inoculation the proportionate mortality from small-pox was as 72 in 1000, while in the last thirty years of the past century it arose to 95 in 1000. Inoculation consequently was a protection to the rich, but it was destruction to the poor, and hence the necessity of this antidote, of which Dr. Jenner so ably and so successfully availed himself.

Remote Cause.—The remote cause of this disease in the cow is probably a poison existing in the atmosphere, but whence derived is quite unknown. The disease, however, for the most part prevails epidemically, and so irregularly, that Talleyrand wrote in 1831 to the French government, desirous of obtaining vaccine matter from a new source, that, after the fullest inquiry, the cow-pox had not prevailed among the cows in this country for more than twenty years. In France it had not been met with up to that time; but in the year 1836, by an inexplicable *bizarrerie*, it broke out in three separate districts in that country, or at Passy, at Amiens, and at Rambouillet.

It is singular, looking to the deep interest connected with the subject, that we are still unacquainted with the exact nature of the vaccine disease as it occurs in the cow, for Dr. Jenner has left us no drawing, and only a very imperfect description of the eruption from which he vaccinated. The difficulties which surround this question will be seen when it is stated that Dr. Heim contends that the cow is subject to no less than eight distinct forms of cow-pox, five of which are communicable to man. Indeed there is no sort of agreement among authors in their description of the cow-pox in the cow: for some describe it as a local disease of the teat, and void of fever; others, as a local disease with fever. Everybody describes the pock as multiplex, and Jenner is supposed to have obtained his first lymph from an epizootic in which the eruption extended from the extremity of the tail to the base of the horn. The last, and perhaps the best, account of the cow-pox in the cow is that of Mr. Ceely, who observed the disease recently in Buckinghamshire, and who has published a description of it, with drawings, in his *Variolæ Vaccinæ*, and has thus laid the foundation for more accurate observation on this interesting subject.

The poison derived from the cow is capable of producing the cow-pox in many animals, as the dog, the goat, the ass, the sheep, and perhaps the horse. Its most important transmission, however, is to man; and matter taken from the cow produces in the human subject the peculiar disease termed the cow-pox; but supposing the pustule to be multiplex in the cow, the disease is so modified that only one pustule, as a general rule, results at each point of puncture in man. Matter taken from the human subject is said, by retro-inoculation, to produce the vaccine disease in the cow; but now, strange to say, if the original disease has been correctly observed, it gives one pustule at each point of puncture, and no more. The laws of the cow-pox virus, when introduced into the human subject, are as follows:—

Predisposing Causes.—As a general principle, to which there are few exceptions, all ages and both sexes are equally liable to this affection. The adult, however, is less susceptible of this poison than the child, and often requires to be vaccinated two or three times before the disease is produced. As vaccination is practised merely as a preventative of the small-pox, it may be necessary to state that, of 8714 deaths from small-pox in 1839, 2235 took place in children under one year old. It will be plain, therefore, that the earlier the little patient can be vaccinated consistent with its health the better.

Contagious.—The contagious nature of this disease is the basis of its use in medicine; and the vaccine poison is found intimately combined with the lymph, the pus, or the crust of the vaccine vesicle. It is most energetic, however, in the lymph; less so when combined with the pus; and most feeble of all in the crust; so much so that Bousquet thinks if the latter be formed on a pustule in any way broken or interfered with, it is entirely useless and inert. An analysis of vaccine lymph has given nothing but water, albumen, and some rudimentary crystals common to all serous fluids; the specific agent escaping detection. The lymph can be preserved in an active state at an ordinary temperature between two plates of glass for a considerable time; but if heated to 120°, or if frozen, it loses the power of communicating the disease.

Fomites.—The fact of vaccination is a sufficient proof of this law.

Susceptibility exhausted.—As a general law the vaccine disease affects the individual but once during life. The more remarkable circumstance, however, is that the vaccine poison not only protects the constitution against itself, but also against the small-pox, and reciprocally the small-pox poison protects the constitution not only against itself, but also against the cow-pox virus. It is upon the presumption that this rule is true that the cow-pox has been introduced into medicine as a preservative remedy against the small-pox. On its first introduction the law was supposed to be universal, but each year's experience has shown numbers of persons susceptible of a modified small-pox, or other more severe form of that disease, after vaccination. The consideration, therefore, of the proportionate number of exceptions to the alleged law is one of the most important questions connected with vaccination, and must determine the actual value of this great discovery.

Dr. Jenner ever entertained the opinion that the vaccine and small-pox virus were essentially the same; he inferred, therefore, that as the patient was occasionally attacked a second time with small-pox, so that vaccination would fail in protecting the system from small-pox in an equal number of instances, or in about one in one hundred. The number of cases of failure, however, are unhappily greatly beyond this proportion, for Bousquet thinks that in the epidemic in Marseilles, one in fifteen of the persons vaccinated took the small-pox; and it results from the best data we at present possess, that in about one person in twenty vaccination loses its protecting influence altogether, or else ceases to guard the constitution beyond a period varying, perhaps, from two to ten years, when the party again acquires a susceptibility to an attack of small-pox; an attack, however, so modified, that the proportionate mortality from small-pox after vaccination is only seven per cent., while the rate of mortality from the natural small-pox, the party not having been vaccinated, is no less than thirty-six per cent., or five times greater.

It is certain, also, that the constitution of a vaccinated person does, in a given number of cases, acquire a fresh susceptibility to the vaccine virus, and sometimes so rapidly that, according to Rouch, modified vesicles may be obtained at a very short period after vaccination. These circumstances may appear to diminish the great value of vaccination; but in estimating the actual result of this practice to the community, we find that nineteen twentieths of the population are permanently protected from the small-pox. Again, if we suppose the calculation to be correct that 40,000 persons died in England and Wales from small-pox in 1800, when the population, according to Mr. Finlaison, was only 9,187,186, the total mortality, taking the estimated population in 1838 at 15,324,720 persons, should in the present day be at least 70,000; but the numbers that died from that disease in 1839 were only 9,131, showing a diminution of mortality from this cause of more than six-sevenths in England and Wales. In short, the reasons for preferring vaccination to inoculation is the annual preservation of more than 60,000 lives.

Co-exists.—The vaccine virus is capable of co-existing with many other poisons, as with that of syphilis, of scarlatina, of measles, or of the hooping-cough. But although cow-pox often exists contemporaneously with those diseases, yet we constantly find the one modifying or suspending the course of the other. Of all the complications of the cow-pox with other morbid poisons, that with the small-pox is fraught with the greatest interest, and we find these two diseases co-existing, preceding, and following each other. If the poison of the cow-pox and of the small-pox be separately inserted in different places, for instance, in the same person and at the *same time*, or within *a week* of each other, both diseases form, co-exist, and each pursues its respective course. The lymph also from the vaccine-vesicle will produce the vaccine disease, while that from the variolous pustule will produce the small-pox. Again, if the two punctures be near each other, one common areola will surround both punctures.

When a person has been inoculated with a *mixture* of the variolous and vaccine poisons, Adams states only one will take effect. This effect, however, is not uniform; for Bousquet inoculated three children with a mixture of the two poisons; two had the cow-pox only, but in the third the cow-pox preceded, continued its usual course till about the eighth day of the disease, when a slight eruption of the small-pox appeared.

If the patient be exposed to a variolated atmosphere at the time he is vaccinated, both diseases will probably result. If vaccine lymph be inserted four days after exposure to the infection of a variolated atmosphere, the two diseases may co-exist, or the one may precede the other. An example of this latter occurred a short time ago in St. Thomas's Hospital; a child that had been exposed to variolous infection for four or five days, was vaccinated, but the vesicle did not rise; a modified small-pox, or variolæ verrucosæ, appeared, and ran its usual course. This disease terminated, the vaccine puncture began to inflame, a vesicle formed, which, though small, ran its course, and had all the usual characters.

"When the small-pox and vaccine diseases have been inoculated about the same time," says Willan, "the eruptions in all the cases I saw were of the species vulgarly called the horn-pock, being hard, semitransparent, and, though of long duration, did not maturate." This statement, as a general principle, is correct, but there are exceptions to it; Bousquet has given no less than sixteen cases in which the cow-pox and small-pox co-existed, and yet all the patients perished.

Variolous matter, inserted on the ninth day after vaccination, appears to have its actions wholly superseded. Bousquet, however, affirms that this protecting influence is imparted as early as the fifth day.

Modes of Absorption.—Vaccination shows that this poison is absorbed by the cutaneous tissue. One puncture is followed by one vesicle, which, when normal, is sufficient to give the fullest protection to the constitution; it is usual, however, to make three punctures on each arm, for the purpose of insuring a supply of lymph. The experiments of Staed show that the poison, after vaccination, is rapidly taken up, and the constitution immediately infected; for in no instance has he been able to prevent the disease, although he has, immediately after the puncture, washed that part with water, or a solution of ammonia, or of the chloride of soda. Bousquet has also attempted to prevent the formation of the vesicle by applying the cupping glass instantly over the punctured part, but although he has kept it on for fifteen, twenty, and even thirty minutes, till phlyctenæ have formed, and blood flowed in abundance, still in no instance has he been able to retard the occurrence of the disease.

Mr. Ceely says, that he has produced vaccine vesicles in young children without puncturing the skin, or merely by keeping lymph in contact with it, and excluding the air by a coating of blood.

Period of Latency.—The usual period of latency is two, sometimes three days; but when the system is under the action of other poisons, the period is often prolonged, and sometimes even three weeks have elapsed from the time of the puncture till the appearance of the vesicle.

Pathology.—The theory of this disease is—the vaccine virus is absorbed, probably infects the blood, lies latent in it a few hours, and then produces its specific action, or a pustule at each point of insertion.

The vaccine pustule runs a given course of varus and of vesicle, terminating by a concretion which forms the crust. The stage of varus lasts but one day. The vesicular stage is four days *umbilicated* and three *acuminated.* The process of incrustation is also three days, and that of detaching the crust three days more; so that, allowing three days for incubation, the whole duration of the disease from the time of puncture to the detaching of the crust is from fourteen to seventeen days. A slight fever usually occurs about the eighth day, and lasts about three days, and occasionally the whole course of the disease is accompanied by a slight fever.

The first day after vaccination we observe nothing but the redness, which is inseparable from every puncture. On the following day it is impossible to determine whether the vaccination has taken place. On the third day, however, sometimes a little earlier, and sometimes a little later, the punctured part is seen to be inflamed, and the varus of the future pustule is formed, and sufficiently elevated to give a sensation of hardness. On the fourth day the varus has considerably enlarged, and on the fifth a vesicle has formed on its apex, and lymph, in some instances, may now be collected from it. This vesicle is yet depressed at its centre, or *umbilicated.* Usually about the eighth day from the time of vaccination, or on the fourth or fifth from the appearance of the varus, the vesicle has attained its greatest size, and is from two to three lines in diameter. It is still umbilicated, its cuticle white and opaque, but a brown spot has appeared in the centre, which shows that the cellular bride which ties it down is about to rupture.

On the eighth day from the time of the puncture, a bright red areola encircles the base of the pustule; an appearance which led Jenner figuratively but happily to remark, that it was now "the pearl upon the rose;" between the eighth and eleventh day the cellular bride ruptures, and the vesicle fills or becomes *acuminated.* At this period the red areola enlarges, and is of a deeper red, while a slight fever, termed the "fever of vaccination," comes on, and lasts from three to four days. About the eleventh day the fever subsides, and between the eleventh and fourteenth days the pustule ruptures, and secretes a fluid which forms a crust. The inflammatory areola has already began to abate, and generally before the seventeenth day the crust falls off, leaving the usual large round cicatrix.

The vaccine cicatrix is round, deep, radiated, and puckered, and is more marked in proportion as it is more recent, but is never entirely effaced by time. Considered anatomically, the vaccine pustule has been compared to a spice-box, being divided into a number of cells, separated from each other by a thin cellular tissue, each filled with a clear diaphanous fluid. These cells do not communicate together, but radiate from the centre to the circumference, the centre being bound down by cellular tissue, giving the umbilicated character to the pustule. This is the state of parts from the sixth to the ninth day; but it does not last, for the lymph now becomes turbid, is mingled with pus, the central bride is broken, the cells communicate, and the pustule rises, is acuminated, and ruptures.

Among the variations in the course of the pustule, Bousquet mentions, that he has several times seen—"plusieurs fois"—such differences in the development of the pustules, that some had run their course while others were only commencing it. M. Fribault has witnessed a fact still more extraordinary, or a pustule which had completed its course beginning *de novo*, and running through it a second time. A still more singular anomaly has also been witnessed, and more at variance with the usual laws of the vaccine virus, or a general cow-pox eruption. Bousquet gives a case in which the supernumerary pustules were so many, that he doubts whether the distinct small-pox ever presented a larger number. A similar case also occurred on the re-vaccination of the Prussian army. A case of this kind also occurred in the child of a gun-smith, in Oxford-street, and which at length died, exhausted by an incessant recurrence of pustules all over the body.

Symptoms.—It is seldom that any other symptoms than those which have been mentioned occur in the course of the disease, except some occasional eruption on the arm, as roseola, strophulus, or lichen, or some unimportant abscess or boil on the same part.

Prognosis.—The prognosis is always favourable.

Diagnosis.—The circumstances of vaccination of the single vesicle, and that at the point of puncture, render it impossible to confound this disease with any other.

Treatment.—The patient should abstain from animal food during the course of the disease; the state of the bowels should be attended to, and occasionally some slight local treatment is necessary, when the arm is considerably inflamed.

OF THE POISON OF SYPHILIS.

Syphilis is a simply contagious disease, consisting of an ulcer termed the "primary symptoms," produced on any part of the body to which the poison may be applied, and also in a given number of cases of many "secondary symptoms," as cutaneous eruptions, warty growths; and also inflammation of the bones, of the ligaments, of the eye, of the nose, or of the throat. This disease often produces much unsightliness, frequently great suffering, and formerly many deaths; but in the present day, owing to the improvements in medicine, the mortality from this affection is trifling, only 142 deaths being recorded from it in the year 1839.

This disease is of modern origin, and first appeared in Rome towards the close of the XVth Century, supposed to have been brought from America by Columbus, but without any sufficient evidence. The epochs in its history are the gradual development of its laws, and the connexion of the primary with the secondary symptoms; also the introduction, first of mercury, then of sarsaparilla, and lately of the iodide of potash, into its treatment.

Remote Cause.—The combination of causes producing this disease is entirely unknown; but so dissolute were the manners of the times, that, in a few years, it spread over the whole of Europe, and has at length perhaps infected every country in the world. The disease is now entirely propagated by human contagion, and the poison in its habits is peculiar to man, for in no instance has matter taken from the primary sore produced any similar affection in animals.

Predisposing Causes.—The principal circumstances which predispose to syphilis are—impaired health, peculiarity of idiosyncrasy, neglect of personal cleanliness, intemperance, and climate.

In general the infection by this poison is more certain, its action more immediate, and its phenomena more severe, in proportion to the enfeebled health of the party. The effects of idiosyncrasy in predisposing to this disease will be seen, when it is stated, of the "filles publiques," some very few escape it altogether, and are never infected, while others may be said to pass their lives in the hospitals. Another remarkable instance of idiosyncrasy occurred in the case of twins born of infected parents, one of which was covered with a syphilitic eruption, while the other was perfectly healthy. The consequences of want of cleanliness and of intemperance in producing this affection are palpable. The effects of climate are remarkable in influencing the occurrence of syphilis; thus the admissions into hospitals for this complaint in the Windward and Leeward command are only 35 per 10,000 annually, while in Great Britain they are 181. The primary symptoms also are said to be milder in tropical than in northern climates, and perhaps owing to the greater cleanliness of the inhabitants. The secondary symptoms, however, have been thought to be more severe in Portugal, in the Bermudas, and in some parts of India, sometimes causing a large non-effective list, or a number of discharges from the service.

Age appears but slightly to affect the liability to this disease; for the infant at the breast, the adult, and even the aged occasionally suffer from it. The strong passions of youth, however, render it more common from early adult age to 30. The sexes probably suffer in nearly equal proportions.

Contagious.—The contagious nature of primary syphilis is generally admitted, for it is a disease which prevails exclusively among a class of persons indiscriminate in their sexual intercourse, while it is entirely wanting in those whose similar indulgences are guarded by a higher morality and a purer taste. Many persons in proof of this doctrine have voluntarily inoculated themselves, and the disease has in most instances followed. Ricord and Beaumés have also recently repeated Mr. Hunter's experiment of inoculating the diseased patient with matter taken from his own primary sores, and in an endless number of instances they have succeeded in producing "a specific primary sore."

The primary sore is very frequently followed by enlarged inguinal glands or bubo, and it has been a question whether matter from these parts will communicate the disease. The experiments of Ricord, however, have shown that a specific virus often can be obtained from the superficial ganglia, but not from the deeper-seated ones, unless the latter be contaminated by pus from the former. The pus also contained in the lymphatic vessels leading from a primary sore, or else in an abscess in its immediate neighbourhood, will also produce a syphilitic ulcer by inoculation.

It seems also established by Mr. Hunter, by Ricord, and by Beaumés, that pus from a syphilitic sore throat, or an inflamed periosteal membrane, or from any other part the seat of the "secondary symptoms," is incapable of producing any specific affection by inoculation, and consequently is not contagious, with perhaps two exceptions, or the ulcerated mouth of a syphilitic child, and also the "pustule muqueux" or warty excrescences, which sometimes form on the genitals. The ulcerated mouth of a syphilitic child, for instance, has sometimes occasioned ulceration of the nipple of the nurse that gave it suck, and this has been followed by slight or severe secondary symptoms. The cases, however, of this kind are few, and perhaps it may ultimately be shown that the disease may have been contracted in the primary form at birth, the mother being infected. The next form of "secondary symptoms" which is supposed to be contagious, are the warty excrescences growing from the genital membranes. Willan says, he has produced them in a healthy person by inoculation, while both Ricord and Beaumés have seen them spread from person to person in a manner difficult to explain, except on the hypothesis of contagion.

The intimate nature of the syphilitic virus is unknown, but its property of infecting is not immediately lost, for Ricord has preserved it in tubes in the same manner as vaccine lymph for seventy-three days, and then successfully inoculated with it.

Fomites.—The repeated instances of inoculation are proofs of the contagion by fomites. Ricord states that the nail is sometimes the instrument of transmission; and he gives instances of persons labouring under syphilis and the itch, who by scratching themselves had produced primary sores in different parts of the body.

Susceptibility not exhausted.—No prior attack, however severe, exempts the constitution in any degree from a second attack of syphilis. Even the existence of either the primary or of secondary symptoms does not prevent the patient from contracting other primary affections. Many unfortunate females in consequence of this law are scarcely ever free from the disease.

Co-exists.—The co-existence of typhus and syphilis, and of syphilis and erysipelas, is of daily occurrence. Syphilis and itch, syphilis and intermittent fever, are also very frequent. The frequent co-existence of syphilis and of gonorrhœa has given rise in the minds of some pathologists to the opinion that the two poisons are identical; but a multitude of experiments have shown that the matter of gonorrhœa will not produce syphilis, unless a chancre exists in the urethra. Neither will the matter of syphilis at any time produce gonorrhœa.

Modes of Absorption.—The poison of syphilis is introduced into the system by means of the cutaneous and mucous tissues.

Period of Latency.—The period usually observed to elapse after connexion till the appearance of the primary sore, is from four to eight days.

The period of latency which elapses before the secondary symptoms manifest themselves is usually long after the cure of the primary sore, or perhaps from six weeks to six months; but cases are numerous in which the period of latency of the secondary symptoms, and especially before the whole series is exhausted, is often singularly long. We constantly meet in the London hospitals with cases in which two, three, or four years have elapsed between the termination of the primary and beginning of the secondary symptoms, and some cases have occurred in which fifteen years have appeared to be the period of latency; and if this be true, a great part of life may pass away before the effects of the poison are entirely exhausted, and the disease eradicated from the system.

Pathology.—The theory of syphilis is that the poison is absorbed and mingles with the blood, and after a certain period has elapsed, produces a specific inflammation in the part to which it was applied and introduced into the system, and which is termed the primary sore. The primary sore being healed, the disease is in many cases at an end, but in a considerable number of instances, the poison remains circulating in the system in a latent state, although disarmed indeed of its power of producing any further primary sore, till at varying and at sometimes very distant periods it causes many " secondary symptoms," or affections of different tissues, as of the skin, the throat, the nose, of the bones, of the periosteum, the ligaments, and also of the eye; not however that the whole of this long series is in all cases set up, for the poison more commonly exhausts itself on one or more tissues only. Such is the theory of this disease. The proofs of the law that the poison is absorbed and mingles with the blood, are the long series of secondary symptoms which are often set up, and at very distant periods from the time of contamination, and also the infection of the fœtus in utero, a circumstance which is supposed to occur in the ratio of 17 in 1000 in the children admitted into the Hôpital des Enfans Trouvée.

The law that the poison produces a specific inflammation in the part to which it has been applied and introduced into the system is so universal, that it is doubted whether it has any exceptions. Mr. Hunter, however, thinks the poison may be absorbed, and the glands of the groin inflame without any primary sore having formed. This form of disease is termed by the French pathologists " bubo d'emblée," and Ricord thinks he has seen it when it was impossible to discover any antecedent or concomitant primary sore, while Beaumés says he has inoculated with matter taken from these buboes, and produced primary symptoms.

The law that secondary symptoms follow the primary sore in a given number of cases is unquestionable, and the returns of the army give one case in fifteen as the proportion.

Primary Syphilis.

The primary ulcer is so much influenced by the constitution of the patient, his present state of health, and perhaps by some modification of the poison, that it is difficult to give any generic description of it. We should imagine ulcers resulting from inoculation must be most uniform in their character. Ricord however states, that although inoculation as a general rule gave a characteristic ulcer, yet they often presented differences so great as apparently to constitute different diseases. Indeed he adds, it is not the form, the induration, or other material circumstance which denotes the peculiar ulcer, but rather the pus it secretes, and the poisoning it gives rise to. All other conditions vary; the secretion and its results alone remain identical. The primary sore, then, is endless in its character, being sometimes an excoriation so slight as hardly to attract the notice of the patient. Sometimes a pimple which itches, or a pustule containing pus, and which being broken incrusts, and under this incrustation is an eating ulcer, and this ulcer may take every character, from the superficial patchy excoriation to the deep wide-spreading phagedenic gangrenous ulcer destroying the entire organ. Many attempts have been made to arrange these different ulcers into species. The most practicable of these arrangements is into the venerola simplex, venerola superficialis, venerola indurata, and venerola phagedenica.

Of these the venerola simplex is the most usual form, and has this peculiarity; that at the time of granulation there is an elevation of the edge, and a rising up of the surface of the sore, which eventually becomes exalted like a fungus above the level of the surrounding parts, attaining its greatest height from the fourteenth to the eighteenth day, and on its cicatrizing leaving a permanent depression, resembling that left by the cow-pox or variola. The time required for healing this sore is generally from four to six weeks, and in general the disease runs its course so mildly, that except the glands in the groin enlarge, or the patient suffers from phymosis or paraphymosis, his general health is seldom impaired. The other forms of venerola may be inferred from their designation; and the reader is referred to the works of Mayo, Skey, Ricord, Hunter, &c., for a more particular description of their course.

The following table, from Boyer, *Pratique de la Syphilis*, 1836, is an approximation to the frequency with which different parts are attacked with primary syphilis:—

IN THE MALE.

Fossa between the glans and prepuce	269
Orifice of prepuce	154
Frænum	132
Internal surface of prepuce	127
Surface of glans	49
Outer surface of the prepuce	45
Body of the penis	41
Orifice of the urethra	11
Scrotum	5
	833

IN THE FEMALE.

Fossa navicularis, or posterior commissure, and between this commissure and the vagina or fourchette	41
Internal surface of the nymphæ or petites lèvres	37
Meatus urinarius	12
Labia externa	6
Carunculæ myrtiformes	5
External surface of the nymphæ or petites lèvres	3
	104

The *number* of primary ulcers is extremely variable, sometimes only one, frequently a plurality, as four, five, or six, while Boyer counted in one person sixteen, and in another twenty-four. In general they are more numerous in women than in men, the surface on which they usually form being more extensive. When there is a plurality of ulcers, they are often of very different characters, some presenting the Hunterian indurated base, while others are free from all hardness.

The *form* of the primary ulcer is more or less round, and its *size* is generally in the inverse ratio of the number, but this is not constant. The glans has often only one chancre, and this seldom exceeds the superficies of a sixpence, but occasionally it extends from the orifice of the urethra to the insertion of the prepuce. On the internal surface of the prepuce they are always large, those of the orifice generally round and small, while those of the external surface of the prepuce, of the body of the penis, and on the scrotum, are usually large. Boyer speaks of having seen them of the size of half-a-crown.

The duration of the primary ulcer is very various; for some ulcers, from which secondary symptoms will result, may heal in a few hours, while Ricord has inoculated from ulcers which have lasted eighteen months. The venerola simplex may heal in a few days, more commonly in about four to six weeks, the venerola indurata in two to three months, while the venerola phagedenica, although it may destroy the part or the patient in a few days, yet, in any other case, is slow in healing.

The cicatrization of primary ulcers offers some differences. When they are superficial, they often heal and leave no trace; but in most cases they have an indelible and visible cicatrix. The Hunterian chancre leaves a deep cicatrix, but without any contraction or diminution of surrounding parts.

Primary ulcers often occasion, as concomitant circumstances, phymosis or paraphymosis, and that enlargement often followed by suppuration of the inguinal glands termed bubo. The duration of the bubo is very various; it seldom lasts less than from four to eight weeks, and often never entirely disappears.

The proportionate number of syphilitic persons suffering from bubo is one in seven, and from phymosis and paraphymosis one in two hundred and six; and it is calculated there are ten cases of phymosis to one of paraphymosis.

SECONDARY SYPHILIS.

The secondary affections of the syphilitic poison embrace a greater variety of disease than results from the action of almost any other poison, as inflammation of the skin, of the throat, of the nose, of the bones, cartilages, and ligaments; also of the eye, and lastly, the formation of many adventitious warty growths.

It is the opinion of some pathologists, that the nature of the primary sore influences the nature, as well as the number, of the secondary symptoms. But every practitioner must have observed so many exceptions to this rule, the severest secondary symptoms sometimes following the slightest and most tractable primary sore; and, on the contrary, the most formidable primary sores being often followed by the mildest secondary symptoms, that the fact is far from established. If, however, we take the nature of the primary sore to be an indication of the constitution of the patient, we can easily understand why similar secondary symptoms may follow occasionally a similar primary sore, and thus form distinct groups or families.

Cutaneous Affections.—Of all the secondary symptoms the affections of the skin are the most remarkable, the same poison producing in different individuals almost every chronic variety of disease to which the skin is subject. There are, however, certain specific differences which distinguish the syphilitic from the ordinary affections of this tissue, which they similate, as the shade of colour, which is of a deeper red or "copper colour;" also a tendency, on subsiding, to stain the natural pigment of the affected part with a dusky hepatic spot, of the same size and form as the original eruption—a discoloration which often long continues to disfigure the patient, together with a greater tendency to run into chronic ulceration. It is also a characteristic of syphilis, that two or three dissimilar eruptions may co-exist in the same patient, and likewise that they are seldom accompanied by itching.

The syphilitic eruptions admit of being classed under the orders papulæ, squamæ, exanthemata, pustulæ, vesiculæ, tubercula, and maculæ of Willan.

Papulæ Syphiliticæ.—The most usual forms of venereal papulæ are lichen, some forms of prurigo, and scabies. The species of lichen met with in syphilis are the lichen syphiliticus and the lichen syphiliticus agrius, or *scabby lichen.*

The *lichen syphiliticus* is an eruption consisting of a number of small, firm, solid elevations, or papulæ of the skin, which inflame and desquamate, leaving the inflamed part covered with a scurf; and among them may occasionally be seen papulæ, with acuminated vesicles containing lymph or pus. The colour of the lichenous spots varies from a pale red to a deep crimson, deadened by the exfoliation of the cuticle, which gives them an appearance of scaliness. As each lichenous spot declines, it leaves a brown or copper-coloured stain of the same size as the original affection, and which frequently lasts a considerable time. This variety often consists of a series of crops, and each crop is frequently ushered in with a smart attack of fever, which does not always subside on the appearance of the eruption. It is usually accompanied by pains in the limbs, which are most severe at night. The papulæ of this eruption are often very numerous, particularly on the face; also on the alæ of the nose, and the commissure of the lips, as also on the back, abdomen, and arms. This form seldom ulcerates, and is not accompanied by pruritus.

The time of the appearance of this eruption after infection is extremely uncertain; but Mr. Carmichael has observed it to occur in the fourth or fifth weeks. Its duration is extremely capricious; sometimes it will decline in a few days, while it may last many weeks or many months. It is distinguished from the ordinary forms of lichen by the papulæ being more numerous and more confluent, and by their running more frequently into small oval clusters, whose greatest diameter may equal that of a shilling; and also by their being separated from each other by interspaces covered with papulæ.

The *lichen syphiliticus agrius* differs from the preceding variety in the eruption appearing without fever, in its being of a brighter red or copper colour, and by discharging a thin fluid, which concretes into a scab; so that should the disease be neglected, the clusters have a tendency to ulcerate. The ulcerated papulæ are generally in large patches, sometimes exceeding two inches in diameter. The lichen syphiliticus is exceedingly common, but the lichen agrius is less so. They often co-exist with most of the syphilitic eruptions, as well as with many other of the secondary symptoms, as affections of the eye, of the bones, or of the throat.

The *prurigo syphilitica* is a less frequent form of cutaneous eruption than the lichen syphiliticus. It attacks principally the pudenda of both sexes, often spreads to the thighs, and discharges an acrimonious matter, which inflames and excoriates the parts over which it flows; or should the eruption occur in the folds of the limb, of the opposite parts with which it is in contact.

The *scabies syphilitica* is the third form of papular eruption, and greatly resembles the ordinary forms of scabies papuliformis, but it is in no degree vesicular, neither is it accompanied by pruritus. It principally attacks the arms, thighs, and trunk of the body, and may co-exist with every form of secondary syphilis.

Squamæ Syphliticæ.—The squamous forms of syphilis are lepra syphilitica and psoriasis syphilitica.

The syphilitic lepra appears in circular patches, which resemble those of the lepra nigricans in size and colour, but are not similarly incrusted. The harshness and dryness also of the skin, so remarkable in the common forms, do not occur in syphilitic lepra. Each patch originates from a small, hard, reddish protuberance, whose circumference gradually increases. The patches are generally distinct, and seldom exceed the size, says Willan, of a shilling, though sometimes they are much larger. They have a raised edge, the central part appearing a flat surface covered with thin white scales. The leprous form of syphilitic eruption takes place, like other venereal eruptions, at very different periods after infection in different cases. If no medicines are employed, it is said to terminate in venereal blotches.

This eruption may be generally diffused over the body, or it may be limited to one or more parts, as the scalp, neck, shoulders, or to the thighs, legs, and arms. When it forms in the gluteal fissure, on the scrotum, or any other part where two surfaces are in contact, the cuticle, instead of desquamating, is smooth, of a dull white or grey colour, and covered with an unctuous matter.

There are three kinds of psoriasis syphilitica, or the psoriasis syphilitica diffusa, the psoriasis syphilitica palmaris vel plantaris, and the psoriasis syphilitica guttata.

The *psoriasis Syphilitica diffusa* scarcely differs from the ordinary forms of this eruption, except in being something deeper in colour. Its most usual seat is the posterior portion of the fore arm, or the anterior portion of the leg or knee; but it may attack many other parts, as the forehead, breast, back of the neck, or pubis. It not unfrequently accompanies periostitis of the tibia or ulna.

The *psoriasis Syphilitica palmaris vel plantaris* is described by Rayer in the following terms:—"In the palms of the hands, and soles of the feet, syphilitic psoriasis is almost always distinct. It makes its appearance by a number of spots, from three or four lines in diameter, but little or not at all prominent, and of a yellowish colour very similar to that of the thick horny indurations of the cuticle, often seen in the palms of the hands. If, at this period of the disease, a portion of the whole of the epidermis be removed, a thin layer of a yellowish substance will frequently be found deposited between the surface of the cutis and the detached cuticle. Small lamellar scales are very regularly thrown off from the palmar surface of the hand, and sole of the foot, which almost always present a mixture of yellow, of red, of violet, and of copper-coloured spots, or blotches surrounded by an epidermic rim. The spots of syphilitic psoriasis are occasionally arranged in the form of a large ring, in the palm of the hand: at other times they present the appearance of a kind of arc of a circle, something like psoriasis gyrata."

When this eruption affects a fold of the skin, as between the toes, or the fingers, or the nates, or thighs, the skin is elevated into a soft flat or convex surface, at first moist and whitish, then excoriated and red, and at length ruptured into cracks, rhagades, or fissures. That part of the finger or toe on which the nail is placed is often attacked, when a separation of the nail follows, and the affection is now termed syphilitic onychia.

"If mercury be not employed," says Mr. Carmichael, "the eruption proceeds to ulceration in the following manner:—Each spot is covered with scales, or by scurf, which is thrown off and succeeded by another; and every succeeding scurf which is formed becomes thicker than the preceding, till at length it forms a crust, under which matter collects, and it becomes a true ulcer, in which state it spreads very slowly."

The *psoriasis Syphilitica guttata* may appear partially or generally on every part of the body, but it is principally on the extremities and on the scalp that it is most frequently seen. It appears in irregular round patches of two to four lines in diameter, more elevated at the centre than at the circumference, of a reddish colour, covered with one or more scales, which are readily detached, and on falling off leave a hard, dry, polished surface. Biet observes, it is always surrounded by a whitish edge, similar to that which marks the disc of a vesicle, but this is not constant.

The *psoriasis preputialis* appears in the form of deep chaps or cracks around the margin of the prepuce, which, like similar affections of the lip, are extremely irritable, and apt to bleed whenever any attempt is made at retraction, but which, from the loose cellular texture of the prepuce, are in this case generally much deeper. The discharge is generally of a glutinous nature, sometimes purulent if improperly treated; the healing process is often very tedious. This disease is apt to give rise to bubo. or enlargement of the inguinal glands.

Exanthemata Syphilitica.—The species of this genus, though very numerous when they arise from ordinary causes, yet in syphilis are chiefly limited to four kinds, or to the roseola syphilitica febrilis, the roseola syphilitica annularis, the roseala syphilitica diffusa, and to the purpura syphilitica.

The *Roseola Syphilitica febrilis* is an eruption which appears either on the face, chest, trunk, or extremities, and is not to be distinguished except by the previous history from the roseola simplex of Willan. It is preceded and accompanied by a sharp febrile attack, lasts about a week, and then terminates by desquamation.

The *Roseola Syphilitica annularis* consists of a number of patches, of a dirty pink or copper-colour, generally distinct, seldom more than half an inch in diameter, and very much resembling the eruption in measles. These patches, when minutely examined, appear to be formed by the aggregation of four or five slightly-coloured points or stigmata slightly prominent; and, as in measles, their colour is evanescent on pressure. They frequently cover nearly the whole of the body, but most principally affect the neck and scalp, the alæ of the nose, the commissure of the lips, and also the forehead. The arrangement of the patches on the forehead is sometimes peculiar, and forms one of the many corona veneris of this disease. This eruption is often tedious, most generally terminating in slight desquamation; but, like all syphilitic eruptions, has a tendency to ulcerate. On dying off it leaves a brown hepatic spot, that for many months continues to mark the form and seat of the original disease.

The *Roseola Syphilitica diffusa* is a diffuse inflammation of the skin, generally of considerable extent, and of a deep red colour. Its usual seat is the back and neck. This eruption frequently co-exists with tubercula syphilitica, and on dying away leaves no discoloration of the rete mucosum.

The syphilitic forms of purpura are, purpura syphilitica and purpura syphilitica hæmorrhagica. Their varieties are not dissimilar to the ordinary forms of purpura described by Bateman. The stigmata of the first variety are extremely minute, sometimes a mere point, not exceeding the bite of a flea. In the second, however, they form large patches, sometimes as big as the palm of the hand. The arms, thighs, and trunk of the body are the principal seats of these forms of disease, which not unfrequently precede the squamous and pustular forms of syphilis, and often accompany the papular and tubercular eruptions. The erythemata syphilitica are rarely followed by iritis, but they are not unfrequently accompanied by some affection of the bones. They also often accompany the papular and tubercular eruptions.

Pustulæ Syphiliticæ.—The ecthyma syphilitica is the only known pustular form of syphilitic cutaneous disease.

The *Ecthyma Syphilitica* is an eruption of pustules about the size of a small-pox pustule, having a hard circular inflamed edge and base. The pustules are, therefore, phlyzaceous. Each is surrounded by a copper-coloured areola, which discharges a sanious matter, which scabs, and on healing leaves a deep cup-like cicatrix, which is permanent. They form principally on the forehead, alæ of the nose, and beard; and as they have a tendency to become confluent, often produce a most unsightly corona veneris. This disease is at all times chronic, and if neglected is said to push forth fungoid vegetations.

Rayer has given a form of ecthyma syphilitica, in which the pustules are psydracious, and consist of minute pustules irregularly circumscribed, slighly eminent, and forming a scab. He represents them as numerous, often confluent, and on rupturing as discharging a thin watery humor, which forms an irregular incrustation. A case of this rare kind was a short time ago in St. Thomas's Hospital, in which the eruption appeared first on the legs, where it left many large rupia like sores, and subsequently a tolerably large crop appeared in the neck.

Vesiculæ Syphiliticæ.—It is doubtful whether any form of this genus exists, except rupia and herpes preputialis.

The *Rupia Syphilitica* consists of a number of dusky brown tumors of considerable size, each of which is surmounted by a vesicle, which breaks and discharges a clear transparent glutinous fluid that concretes into a scab, having a peculiar conoidal form resembling a limpet shell, in consequence of each successive formation being larger than the one that preceded it. Beneath this remarkable incrustation, however, a slow process of ulceration goes on, so that on the scab falling off a wide-spreading ulcer is seen, sometimes superficial, but at others deep and foul. In the latter case it occasionally penetrates to the tibia, the ulna, the clavicle, or to the bones of the nose, or of the cranium, causing ulceration and caries of those parts. This ulcer heals from the edge, and when completely healed the cuticle, according to Rayer, repeatedly desquamates, a result, however, by no means constant. On healing, the ulcer leaves a permanent cicatrix.

This disease usually appears on the legs and thighs, or on the arms or back. The face and scalp are also often its seat, as also every part of the nose, eyebrow, and even the inner eyelid, and it may form on every other part of the body. The number of these tumors is seldom great, often not more than two or three, and seldom more than twenty. In size they generally vary from a small nut to a walnut. Their duration depends, in a great measure, on the treatment; for if left to themselves, they often continue open sores for many months.

The most remarkable circumstance connected with rupia is the extreme depression of the constitution which accompanies it; for many strong, and even robust, persons become greatly worn, and even emaciated, under its influence, and in a degree by no means accounted for by the extent of the ulceration. In many instances this disease has proved fatal.

The herpes preputialis first appears as a cluster of vesicles which scab, and this being removed, a number of small circular ulcers is seen, with a yellow or white surface, often running into one another, with an edge sometimes a little raised, and of which the healing process is sometimes tedious.

Tubercula Syphilitica.—The term tubercle, in dermatology, does not imply that peculiar substance which bears that name when deposited in the lungs, but is defined to be a small, hard, superficial, isolated tumor, or elevation of the skin, resembling a wart in character, ordinarily isolated, but sometimes confluent, and whose natural course is to terminate in slow ulceration. Of tubercula syphilitica there are two varieties, or tubercula syphilitica rubra, and tubercula syphilitica flava, and these may be either round or flat.

The *Tubercula Syphilitica rubra rotunda* consists of a number of firm, solid, moveable tumors, of a conoidal form, and about the size of a split pea, *red*, not painful, nor the seat of pruritus. They are usually very numerous, and appear sometimes on the face, but more commonly on the trunk of the body, and especially over the back and shoulders. This disease often assumes a particular form, and sometimes, if neglected, ulcerates. Its duration is very various, and though it may terminate in a few weeks, it usually lasts two, three, or four months, or longer.

The *Tubercula Syphilitica rubra plana* consists of a number of flat tubercles, having an equal thickness over their whole surface, except at the edge, where it is in more prominent relief by a line or more. Their colour is of a livid red, and their size varies from a lentil to the palm of the hand. This variety has a great tendency to ulcerate, and then the edge thickens and rises, so that the body of the tubercle generally appears depressed. The swollen surface becomes fissured and secretes a faint dirty white matter. These fissures sometimes increase to considerable ulcers, and on healing their cicatrices at first resemble yellowish or violet-coloured blotches, and do not acquire a natural colour or proper pliancy, until after a very long period. It is remarkable also to observe these ulcers, as in cancer, healing in one direction and spreading in another. They are attended with little or no pain, and with little inflammation beyond their edges, which are deep and sharply cut. Sometimes, however, they assume a phagedenic character, so that when they attack the face they do not present regular cicatrices, but unsightly bands, or rather seams, as after severe burns, or in the lupus exedens.

The duration of the flattened form is always exceedingly chronic, and when ulcerated the process of healing is extremely slow. Its principal seat is the pudendal region, as the labia majora, glans, or scrotum; sometimes they form round the anal aperture, and their fissures may then penetrate the rectum. More commonly, however, they form on the inner part of the thighs, the groin, and over the gluteal muscles, or on the trunk; they are also occasionally seen on the face, lips, and ears.

The *Tubercula Syphilitica flava, vel rotunda vel plana*, does not differ from the red variety, either in seat, form, duration, or termination, or in any other respect than the tubercle preserving the colour of the skin. Sometimes, however, these pass into the red state.

Among the tubercula must be classed those many vegetations, excrescences, or warts which are so frequent in syphilitic patients.

These vegetations are developed in two different manners, each influencing the form they afterwards take. In the one the vegetation first appears about the size of a large pin's head, and is most commonly white, but in some few instances red, and we feel on the surface inequalities, as in a strawberry. The vegetation increases till it is termed cauliflower, cockscomb, or, when springing from distinct sources, asparagus, or other familiar name.

This species also includes all those varieties which have been classed under the heads of rhagades, fici, condylomata, &c. It also includes those hypertrophied and elongated labia or nymphæ, which are often of monstrous growth, and hang pendent for many inches. In general they grow from those parts which were the seat of the primary sore. These growths are most common in the female.

Maculæ Syphiliticæ.—Maculæ syphiliticæ are partial discolorations of the skin, forming patches which vary from a sixpence to the size of the open hand. They are either of a yellow or brown copper colour, and appear to depend on an alteration of the pigment of the rete mucosum. In general the maculæ terminate without any other sensible alteration than of the colour of the skin. But in a case lately in St. Thomas's Hospital these patches exhibited the remarkable phenomenon of ulceration under the cuticle. The ulcer thus formed had a sharp edge, as though made by a punch, and its base was about two lines below the surface of the skin in every part. It was covered by the cuticle, not detached, but puckered up, so as to lie loosely upon it, and presented a most beautiful specimen of the dry ulceration of Mr. Hunter. The maculæ form principally on the trunk, frequently covering a large space, and often on the face and extremities. The duration of this form of cutaneous eruption is always extremely long, and may last many months or even years.

Of the Syphilitic Diseases of the Osseous System.—Next to the dermoid tissue, the osseous system is the most frequent seat of the secondary action of the syphilitic poison, and its diseases are important, as they are frequently of long continuance, often disfigure the patient, and are in most instances the cause of severe suffering. Some pathologists, in an excess of scepticism, have doubted the action of the syphilitic poison on the bones, but the public have entertained no such difficulty; and the poet whose Court of Death we have before quoted, embodies this doctrine in the following lines:—

> " A haggard spectre from the crew
> Crawls forth, and thus asserts his due:—
> ' 'Tis I who taint the sweetest joy,
> And in the shape of love destroy;
> My shanks, sunk eyes, and noseless face
> Prove my pretensions to the place.' "

The principal syphilitic affections of this system are inflammation of the periosteum, and inflammation with enlargement, ulceration, abscess, or necrosis of the bones themselves. It is remarkable that these affections differ in many important circumstances, according as they occur in the flat or in the long bones.

The periosteum of the long bones is subject to syphilitic inflammation, which probably often extends to the bone itself. The result of this inflammation is thickening of the periosteal membrane, and the deposition of a hard membraniform substance on the surface of the bone, and which, if recent, may be removed by maceration. This newly-formed part is termed " *a node*," and it may be absorbed, may ossify, or may ulcerate. The termination by absorption, however, is seldom seen, unless the disease be recent, and the patient early submitted to medical treatment. The termination by ossification was formerly the most frequent, and in this case points of ossific matter are first deposited throughout the membranous substance of the node, which gradually multiply until they form a bony mass, or tumor of greater or less size and solidity attached to, and at length forming an integral part of the bone. The node thus ossified is, under the most favourable circumstances, only slowly absorbed, and many years may perhaps pass away without any great reduction, during which the patient is liable to continual relapses.

The hard periosteal node, whether membraniform or ossified, formerly often terminated by suppuration; the pus effused forming a superficial, fluctuating abscess, surrounded by the sharp edge of a deep cup-like ulcer. The pus thus formed may be absorbed, and the abscess heal, or else it may burst, or make its way to the surface, and in the latter case the bone may be exposed, or so affected that it may exfoliate.

The periosteal node just described does not attack all the long bones equally, never attacking the phalanges of the fingers, or the bones of the feet, but has its seat almost exclusively on the bones of the leg, of the fore arm, and of the clavicle. Neither does it attack all these bones with equal frequency, for the hard node exists much more commonly on the tibia than on the fibula, and on the ulna than on the radius, while the clavicle is only occasionally the seat of this affection. When the tibia is affected the centre of the shaft of the bone is more commonly the part diseased, then the lower third, and more rarely the upper third of the bone, and both tibia are more commonly affected than one. When the ulna is affected, it is the upper third on which the node more usually forms, and one ulna is more usually diseased than both. It is doubtful whether the femur or the os brachii is subjected to this form of node, although it seems proved that their shafts are occasionally the seat of syphilitic inflammation.

The long bones also are sometimes the seat of a disease termed " the soft node," or more popularly the " gummy node." This disease consists equally with the former, of an inflammation of the periosteum; but according to Desruelles, of its external surface, and also of the intercellular tissue of the muscles, and of the ligaments terminating in the secretion of a fluid of the consistency of gum water, of a thin jelly, or of still greater firmness. This form of node is of so rare occurrence, that it is doubtful whether it has been rightly attributed to a syphilitic origin. It is attended with less pain than the hard node, except it presses on a nerve, when every motion of the limb is excruciating. It is usually indolent, but has a tendency at last to ulcerate, sometimes extensively and deeply, so that not only exfoliation but death has followed. The tumor is generally moveable, and the skin, unless near bursting, of its natural colour. Its usual seat is either the fore arm, the leg, or the head. This node is of difficult cure, and its duration indefinite. Its fluid contents require to be analyzed.

The syphilitic poison may also cause inflammation of the substance of the long bones, especially of the thigh bones and the phalanges of the fingers, terminating in enlargement, in ulceration, in abscess, in caries, or in necrosis of those parts.

The periosteum of the cranial bones is often affected in syphilis, but the node now formed follows, to that of the long bones, entirely different laws. When the syphilitic poison produces nodes on the cranium, we might be led to imagine, from the external appearance, and from the firmness and resistance of the node, that it was of exactly similar formation to that of the tibia and ulna, and that a membraniform substance, ossified or otherwise, was deposited on the bone. But on a careful examination of many syphilitic crania, no membrane or ossific matter has been found in the node, so that it is probable that the hard, immoveable, external cranial node is caused by an infiltration of the soft parts, bound down by their peculiar aponeurosis. Even in those strangely worm-eaten skulls in which deposition and absorption, thickening and thinning, newly-formed parts and immense voids, are so singularly intermixed, no membraniform or ossified substance, similar to that of the tibial node, is to be seen. This node much more frequently suppurates and ulcerates than the nodes of the long bones. Its more usual seat is the frontal and parietal bones, and there is seldom more than one or two, or at most three.

If the disease proceeds the bone itself is affected, and ulceration and extensive exfoliation of the outer table often takes place, and the disease sometimes spreads, even to the inner table, exposing the membranes of the brain. A portion of the cranial bones being destroyed, pathologists are not agreed in what manner the injury is repaired; but the more common opinion is that the void is first covered with soft parts, and then that a slow process of ossification goes on, so slow that a long period elapses before the defective part is repaired by ossific deposit.

The syphilitic poison may also fall on the bones of the face; and we have many specimens in our museums, in which the ossa malarum and the bones of the orbit are extensively eroded from ulceration. But syphilis is now so easily and so completely checked by medicine, that any affection of these bones is extremely rare.

The bones, however, of the nose and palate are still found to be frequently diseased. In these cases the affection may begin by inflammation and ulceration of the mucous membrane, but more commonly perhaps the disease is seated in the bones themselves. This inflammation, in whatever manner set up, usually terminates in necrosis, sometimes so extensive that the vomer, the ossa unguis, the turbinated bones, or a considerable portion of them, exfoliate. The cartilages, as well as the bones of the nose, are also frequently involved in the disease, so that the hard parts being thus withdrawn the soft parts fall in and produce a permanent and most unsightly deformity. Thus the alæ of the nose may alone be destroyed, or else the whole of the proper bones may exfoliate, and the soft parts sinking, nothing but the mere tip of a nose is to be seen.

It is seldom that the bones of the nose are affected in any considerable degree without the palate-bones ulcerating, and also exfoliating to a greater or less degree. In this latter case it is the superior maxillary bone, and not the palatine bone, which forms only the posterior fifth of the palatine arch which is affected, and usually the middle of the horizontal portion of it, or only in a few instances posteriorly towards its union with the palatine bone. At other times, but more rarely, the anterior portion of the superior maxillary bone, and which contains the alveolar processes of the incisor teeth, is its peculiar seat. It is generally, but not constantly, the suture which unites the two superior maxillary bones which is the part attacked, and more frequently one bone affected than both. The exfoliation of the necrosed portion always leaves an incurable perforation, unless it be extremely small indeed.

In general the periosteal affections of the cranium and of the long bones occur from a few weeks to three or four years after contamination, and are accompanied by a degree of pain and tenderness almost amounting to agony, and in a short time greatly reduce the patient. On the contrary, however, the affections of the nasal and palatine bones, even when the devastation is excessive, are seldom accompanied by severe pain. In affections of the nose most commonly the patient's attention is first awakened by a swelling and uneasiness of the parts rather than by pain. These symptoms are followed by a discharge from the nostrils, at first small in quantity, serous and inodorous, which often concretes into a thick and troublesome scab. As the disease, however, advances the discharge becomes purulent, mixed with blood, and when the bone is necrosed sometimes insupportably fœtid. In this state the disease is termed ozena or ozema. There are cases in which the mucous membrane is so entirely removed that we can see the denuded bone, while we can almost always detect it by the probe.

When the palate-bones are diseased the discharge from the mouth is seldom considerable, except in a few instances, when the quantity from the antrum is distressingly large. The soft parts at length ulcerate, and exfoliation of a part of the arch follows. When exfoliation has taken place there is always an aperture by which air, and also liquids, can pass from the mouth into the nose. As long as the aperture is small the consequences are rather disagreeable than inconvenient; but when large the voice is altogether changed, and the patient speaks through his nose. Deglutition is also difficult, because the aliment can no longer be pressed against the palatine arch without passing wholly or partially into the nasal cavities. Another inconvenience likewise results, or the occasional discharge of the nasal mucosities into the mouth. The duration of the syphilitic affections either of the nasal or palatine bones, if left to nature or improperly treated, lasts for many months, and only terminates after great destruction of parts. Under a judicious treatment a cure is generally effected in a few weeks, and without disfiguration.

The cartilages, especially those of the sternum, are the occasional seat of the secondary affections of the syphilitic poison. The opportunities, however, of examining these parts are few, since the disease in almost every instance is cured; but the symptoms are those of inflammation, with great thickening, except in some few cases when ulceration and perhaps necrosis follow.

The fibrous capsules and the ligaments which surround and unite the articulations of the larger joints are often attacked, and form a large amount of the cases of secondary syphilis. These affections may be either acute or chronic, and do not essentially differ from those of acute or chronic rheumatism. Boyer states that articular dropsy is a common result, and which terminates in an impossibility of extending the affected limb. Inflammation of the interior of a joint, especially of the elbow-joint, is by no means unfrequent. Pains similating rheumatic pains, and enlargement of the joints of the finger, as in gout, are likewise common. The duration of this class of affections is often long, and the treatment unsatisfactory.

Of Syphilitic Diseases of the Throat.—The parts next in frequency of attack and severity of symptoms after the cutaneous and osseous systems are those of the throat, which may be divided into angina syphilitica mitior and into angina syphilitica gravior.

The *angina syphilitica mitior* has many grades. It may be limited to a slight blush of inflammation, which may resolve, and the disease be at an end; or it may be characterized by an exceedingly hard and enlarged state of the tonsils, whose superficies is covered by patches of a viscid mucus or lymph, and at a subsequent stage by a number of small superficial ulcers. In other cases the tonsil is much less swollen, and a small chronic ulcer forms on it, sometimes of no great depth, while at others there is a fair loss of substance. Again, another form of syphilitic sore throat is when the parts are little swollen, but a superficial ulcer with a distinct edge spreads far and wide, healing in some parts and spreading in others, after the manner of a superficial phagedenic ulcer. This description of ulcer is often of long duration and difficult of cure.

The *angina syphilitica gravior* is characterized by no very considerable enlargement of the tonsils, but the inflammation is usually extensive, embracing the tonsils, velum palati, the uvula, and very commonly the pharynx. The inflammation is also much more asthenic, and usually begins by a diffuse redness of the mucous membrane of the throat generally, and in a few hours a foul and deep ulcer forms on each tonsil, having a broken-down irregular edge and a base covered with a dirty ash-coloured slough, the whole surrounded by a deep-coloured erysipelatously inflamed margin. The ulceration of the velum palati may begin either on the anterior or posterior surface of that membrane: in the latter case, if the disease be rapid, the velum may be destroyed almost before the disease is discovered, or even suspected to exist.

The uvula also is usually attacked at its base, generally at the posterior part, where an eating ulcer forms, and so rapid in its course that the uvula is constantly seen hanging in the fauces by a mere shred, so that the least delay in the administration of proper remedies is often followed by the entire loss of that part. Indeed, in the greater number of cases it is already detached before the patient is admitted into the hospital. From the tonsils and soft palate the inflammation may spread to the arch of the palate, or up the nasal fossæ, and thus lay the foundation of the destruction of the nasal and palatine bones.

The most appalling symptom, however, is when the inflammation extends to the pharynx. In this case the ulceration may be so situated as to be hid by the velum or by the root of the tongue, and, thus concealed, may make extensive ravages before it is discovered. More commonly, however, a single ulcer forms in the central and visible part of the pharynx, having an irregular broken-down edge, a dirty base, and surrounded, as in the former case, by a wide extent of angry erysipelatous inflammation. This frightful ulcer sometimes continues to spread as far as the eye can reach, so that the whole back of the pharynx is often one universal foul sore, sometimes penetrating so deeply that the spinal bones may be both seen and felt.

From the pharynx the inflammation may extend to the Eustachian tube, and the patient be rendered either temporarily or permanently deaf. Occasionally it involves the glottis, epiglottis, and even the larynx: when the larynx is affected the symptoms are, difficulty of breathing, with the stridulous whispering voice of croup, constant cough, and copious expectoration. The epiglottis has also been known to slough off, and then the patient can only swallow by holding his nose. Mr. Carmichael gives two cases of sudden death in the Lock Hospital from foreign bodies under these circumstances slipping into the trachea; and Mr. Mayo another, in which the patient died of ulceration of the lingual artery with hæmorrhage, notwithstanding a ligature was applied round the common carotid. When this pharyngeal disease terminates favourably a cicatrix forms, much whiter than the mucous membrane, striated and banded in every direction; and as it has less vitality than the membrane for which it is a substitute, it is liable to frequent but slight relapses. If the patient falls the throat becomes dry and brown, the pulse rapid, great restlessness supervenes, the legs swell, and the patient dies with the worst symptoms of hectic or continued fever.

Syphilitic angina is rarely accompanied by fever in the early stages, and this is the great diagnostic symptom which distinguishes it from the ordinary forms of sore throat, for it is needless to say that the copper colour of the inflammation attributed to it by some writers never exists. If left to itself, syphilitic angina is of almost endless duration, and sometimes of fatal termination. It often co-exists with every other secondary symptom.

Of the Syphilitic Diseases of the Eye.—The eye is less frequently affected by the syphilitic poison than the skin, the bones, or the throat, but still inflammation of this organ is by no means unusual, and its principal seats are the conjunctiva, the transparent cornea, the iris, and, judging from the degree in which the eye is pained by light, the retina, and perhaps also the entire globe of the eye.

Syphilitic inflammation of the *conjunctiva* may exist *per se*, or it may be conjoined with iritis, and the latter is much the most frequent. Its pathological character is diffuse inflammation, of greater or less extent, of the conjunctiva, varying from an arborescent state of the vessels to a general congestion, changing the brilliant white of this membrane to a livid red. Immediately around the cornea is a zone of still deeper intensity, which strikingly contrasts with that transparent tissue.

The *transparent cornea*, though nourished by vessels carrying transparent colourless fluids, is nevertheless susceptible of high inflammation. This inflammation occasionally exists *per se*, and may terminate by effusion of lymph or by ulceration. When lymph is effused it is poured into the lamellated structure, so that the eye is dull and the cornea nebulous or opaque; and if it be deposited generally over the pupillary portion, the membrane becomes impenetrable to light, and blindness is the consequence. If the disease proceeds, red vessels are seen to shoot into the effused lymph, and the superficies of the cornea frequently ulcerates.

The most remarkable affection, however, in syphilitic ophthalmia is *iritis*, which usually accompanies the preceding forms of the disease, and its termination may be by resolution, the throwing out of lymph, or by the effusion of pus. In general the syphilitic inflammation attacks the posterior rather than the anterior surface of the iridial membrane, which becomes thickened, the pupil contracted, and often so diminished as scarcely to exceed the size of a pin's head. The iris thus contracted generally forms adhesions more or less partial, so that the pupillar edge appears puckered, irregular, and, instead of a circular, often takes a polygonal shape, with three or more sides. The inflammation, however, is rarely confined to the posterior, but very constantly involves the anterior surface of the iris. "In this case," says Mr. Lawrence, "the iris loses its brilliancy, appears dull and dark, and the beautiful fibrous arrangement which characterizes it in its healthy state is either confused or entirely lost; a light-coloured iris assumes a yellowish or greenish tint, a dark-coloured iris a reddish brown." Vessels carrying red blood are also now seen radiating on the outer surface, often depositing lymph of a reddish brown or ochre colour, or tinged with blood in various manners, and occasionally in such quantities as to hang pendulous in the outer chamber of the eye, or else to thrust the iris forward by its accumulation in the posterior chamber of the aqueous humour. If the inflammation proceed, this may become organized, and present a permanent obstacle to the transmission of light, or the capsules of the lens may be thickened and rendered so opaque that the patient may become temporarily or irrecoverably blind. The disease may proceed to still further destruction of parts, but in general it is early subdued by medicine, when it usually terminates by resolution, and before any irremediable alteration of structure has taken place. In this case the red vessels disappear, the effused lymph is absorbed, and the adhesions being recent and slight are readily broken down, and the patient ultimately recovers the perfect use of the organ. But its powers are often for a time impaired, so that vision is either confused or weak; neither does the pigment of the eye immediately resume its colour, but is so changed that a hazel eye is turned to grey, and a black eye to a green one, and the patient after his recovery has perhaps one eye of one colour and the other eye of another colour, and neither of them the natural colour—an unsightliness which may last for a considerable time.

Inflammation of the cornea or of the conjunctiva is rarely accompanied by severe pain, but more commonly by soreness; a sensation of dryness; great weakness of sight, and by an increased lachrymal discharge. Iritis, on the contrary, is usually attended by severe, agonizing, deep-seated pain, and by intolerance of light. There are, however, a few instances in which the pain is trifling, and the sight merely weak. Syphilitic Ophthalmia is in general double, but in a few instances is limited to one eye. The duration of the various forms is usually short, as they readily yield to a mercurial treatment. In general, iritis is preceded by one or more of the secondary symptoms, and most commonly is that affection which terminates the disease. It is said to be more frequent in women than in men, but this proposition is not established.

Treatment.—The cure of the primary ulcer has never been esteemed one of the great difficulties in the treatment of syphilis, for at all times, it has been observed often to yield to very trifling remedies; very generally to greater or less doses of mercury, and only in a few instances assuming an intractable or phagedenic form. In practice, however, this problem has been rendered one of the most intricate in medicine, from the various theories which have been connected with it. Some, for example, have considered the primary ulcer to be at first a local disease, and that the poison which contaminates the constitution is secreted by it, and consequently that early cauterization would prevent the occurrence of all the secondary symptoms; others again have held that mercury was essential to the cure of the primary symptoms, for without it they would not heal, and therefore that the system must to a certain extent be saturated with that metal; while others, again, have affirmed that medicine not only to be a remedy for the primary form of the disease, but also a specific antidote against the poison of syphilis, so that a given quantity was an infallible prophylactic against all the secondary symptoms, as well as a cure for them in every stage. These hypotheses, however, are altogether unsound, or in contradiction to all we know of the laws of morbid poisons—for mercury has been often proved not to be essential to the cure of the primary symptoms; neither is the poison secreted by the primary sore that which contaminates the constitution, so that cauterization will not cure the disease. Again, mercury is not a prophylactic against the secondary symptoms, for no quantity, however large, will prevent their recurrence, although it must be admitted that that medicine is often a remedy of great value in their cure. It follows then, from these considerations, that the rule of treatment in syphilis is to heal the primary sore as rapidly as possible, and to employ for that purpose the simplest and least injurious means in our power; and in this manner we effect not only the greatest present good, but also afford the patient the greatest number of chances of escape from an attack of the secondary symptoms. Again, should any secondary symptoms arise, we should treat it on the same simple principles as the surest prophylactic against any further number of the series; and consequently we thus greatly mitigate the sufferings of the patient, as well as shorten the whole duration of the disease.

Applying these principles, we find that a large proportion of the *unindurated* primary sores treated in the army, have been healed without mercury, except perhaps some mercurial wash or local application; and principally by confining the patient to his bed, or else to the wards of the hospital; and also to a spoon diet. The remedies employed in addition have been extremely simple, or occasionally general bleedings (as in six or eight cases out of 1940), purgatives, antimonials, emollients, soothing applications, generally cold or warm water mixed with the liquor plumbi; and in the latter stages by the application to the part of the lotio hydrargyri submuriatis or muriatis in aqua calcis, or else the lotio cupri sulphatis vel argenti nitratis, or other similar means.

In civil life, the same results have been obtained where the same means have been employed; but it is rare that the time necessary for the cure to take place can be commanded, and most writers recommend that the unindurated sore should be treated at first as a simple ulceration, or by cleanliness, by abstinence, and by applying to it the most mild and simple dressings; and many ulcers that will be followed by secondary symptoms will heal under this simple treatment. If the ulcer does not put on a healing appearance after a reasonable time, the patient should make use of more active dressings, as the black wash; and should these be ineffectual, and the sore still remain open, a mild and judicious administration of mercury should be had recourse to till the sore is healed. In most cases, the pil. hydrargyri, gr. v. twice or thrice a day, is sufficient, and the success of Mr. Abernethy has proved that a large majority of primary ulcers will heal under this treatment.

In addition to the above remedies many practitioners recommend the application of lunar caustic to the sore, whatever may be the stage of the disease, as a means by which the process of cicatrization is greatly assisted. Mr. Carmichael, however, limits the time to the first stage, and before pus has formed. Ricord also tells us to abstain from using caustic to the part while it is yet granulating, and to confine its employment to points still in a state of ulceration—discrepancies which show that the practice is anything but determined.

The superficial venereal ulcer or excoriation "is the most easily cured by any mild astringent lotion injected five or six times daily between the glans and the prepuce, or the yellow mercurial lotion, or the weak solution of lead, or of the sulphate of zinc."

The indurated ulcer, like every other form of primary syphilis, has been successfully treated without mercury. But it does not by any means follow that the non-mercurial is the most judicious mode of treatment. Indeed, almost all British writers are agreed that recovery under that method has been remarkably slow, while, if mercury has been exhibited, the healing of the sore has been certain and rapid. Ricord also states, that although the exhibition of mercury for unindurated ulcer is often more hurtful than beneficial, yet the circumstance of induration immediately transforms it into a therapeutic means of great power. In the treatment of the Hunterian sore, therefore, nothing is doubtful or perplexing; the rule being by mercury, and the exceptions only those cases where its use is forbidden by a debilitated or scrofulous diathesis, or by other peculiarity of constitution. The manner of introducing mercury into the system must be left in a great measure to the discretion of the practitioner. If the case be slight, five grains of the pilulæ hydrargyri twice or thrice a day is sufficient. It is more common, perhaps, when the case is well marked, to rub in half a drachm or a drachm of strong mercurial ointment every night, and this quantity is generally sufficient to touch the mouth in six or eight days, and to produce a considerable soreness at the end of twelve days; and shortly afterwards the ulcer heals.

When the ulcer has cicatrized, and the tissues which have been its seat have recovered their healthy state, the disease is cured. Sometimes, however, an induration remains, and in this case the cicatrix often ruptures, and relapses are the consequence. Under these circumstances, we should be cautious not to lay aside the use of the ointment too soon, and the patient should rub the part twice a day with mercurial or iodine ointment; a practice often successful when the indurated portion is situated on the skin, but not so commonly when on the mucous membrane. Delpech and many other surgeons have recommended excision, and this operation has succeeded, but more commonly has been followed by a renewal of the disease, so that it ought not to be employed except when the cicatrix is small, or of a cartilaginous hardness, and moveable in the subjacent cellular tissue. The resolution of this induration is, however, always tedious.

With respect to local treatment in the indurated ulcer, Beaumés states that it is not so advantageous as in the unindurated ulcer, and is favourable in proportion as the induration is dissipated by a mercurial treatment. All are agreed that fatty substances are ordinarily hurtful in the treatment of the indurated primary sore, and especially mercurial ointments. Many authorities also recommend cauterization in this form of ulcer, but this practice cannot be received as universal; and Ricord admits when the induration is even of little extent, cauterization is much less efficacious than under other circumstances.

Treatment of Venerola Phagedenica.—Ricord divides this description of ulcer into three kinds, or the indurated phagedenic ulcer, the phagedenic gangrenous ulcer from excess of inflammation, and the phagedenic gangrenous ulcer from debility or constitutional tendency.

The induration of a venereal sore or part may so increase as not only to oppose the formation of a cicatrix, but also to make such compression as to produce gangrene. In this form of the disease he recommends a concentrated solution of opium, emollient cataplasms, and antiphlogistic remedies. When the ulcer is of little extent, cauterization with the argentum nitratum, though not greatly successful, is still useful, and often stops the progress of the gangrene and represses those exuberant vegetations that have a tendency to become fungoid, and, much as mercury is hurtful in the other forms, by so much the more it is advantageous in this.

In the treatment of the gangrenous sore by excess of inflammation, he tells us we must forget the specific nature of the malady, and treat it merely with reference to this excess of inflammation. How many accidents, says this eminent authority, have we not seen from an empirical mercurial treatment directed against the specific cause! Dr. Collis also states, that throwing in mercury largely and suddenly was, in many cases, not successful.

The *Phagedenic Gangrenous Ulcer* from debility or constitutional idiosyncrasy is a form of disease most usually contracted in hot climates, and makes such havoc when the patient returns to the north, and is termed the "black lion." It is also sometimes contracted by persons living in low and damp situations, and is often suddenly and happily changed by transferring the patient to the wards of a well ventilated and well situated hospital. "In this form of gangrene," says Ricord, "it is a very great error to fly to the use of mercury. I can affirm, with very few exceptions, that nothing can be worse than mercurial dressings and mercury exhibited in this form of disease;" and he recommends repeated cauterization and an application of aromatic wine; and in severe cases, he sprinkles the part with powdered lytta and the "*pâte de Vienne*," which daily experience, he adds, authorizes him to recommend.

Treatment of Phymosis and of Paraphymosis.—Phymosis and paraphymosis are much less frequent attendants on indurated than upon unindurated sores; but whenever a disposition to phymosis or paraphymosis occurs, the patient should be strictly confined to the recumbent position, and in the former case be desired to inject warm water frequently between the glans and the prepuce. Poultices of bread and water may also be applied with advantage, and antimony given in such doses as may excite slight nausea. These means are often sufficient, but when the inflammation is violent, the penis considerably swollen, and attended with acute pain, if the most active measures are not adopted, the inflamed parts will fall into a state of mortification. "In these cases," says Mr. Carmichael, "the symptomatic fever may run so high that the pulse is from 110 to 130, with thirst and restlessness; under such circumstances I immediately direct blood to be taken from the arm in proportion to the urgency of the symptoms and health of the patient, and repeat venesection every six to eight hours until the inflammation begins to yield. It is as necessary to have recourse to the lancet in these cases as in pleurisy or the most acute ophthalmia. However beneficial *local blood-letting* may be in inflammation of other parts, it is scarcely admissible in this; for if the matter which flows from beneath the prepuce should come in contact with the wounds, troublesome sores might follow, which might still further add to the inflammation it was intended to subdue. By active measures of this kind, if employed in time, we shall avert the worst result, a mortification of the prepuce, or suppuration of the body of the penis under its investing ligaments." In the phagedenic form of this affection the danger is imminent, and the best surgical advice should be had recourse to, and the division of the prepuce, if recommended, be immediately submitted to. In the

Treatment of enlarged inguinal glands, termed "Syphilitic Bubo," Mr. Carmichael has not found from experience that mercurial frictions will discuss them. On the contrary, the trials he has made incline him to believe that this medicine rather tends to increase their inflammation and consequently their tendency to suppurate. The application, however, of leeches and cold lotions, with attention to rest and quietness, he says, will often succeed in discussing them. When the bubo is hard and indolent, showing neither a disposition to disperse or to suppurate, he recommends the application of blisters to the indurated bubo, which soon either causes the dispersion or the suppuration of the tumor, and thus frees the patient from a troublesome symptom which might otherwise continue many months to torment him. If suppuration takes place, and the syphilitic bubo has broken, and the sore has a callous feel, and is either of a dark foul appearance, or of a light brown tawny colour, and this ulcer spreads, he says we may, with confidence, have recourse to mercury; and we shall in most instances find that quick amendment follows its exhibition. In general, also, after matter has formed, small doses of pil. hydrargyri have been found useful. The iodide of potassium has been strongly recommended in all forms of bubo by many foreign writers, but that medicine has not supported in this country the reputation it has acquired on the continent for the cure of that affection.

Treatment of the Secondary Symptoms.

If the problem of the treatment of the primary symptoms be difficult, that of the treatment of the secondary symptoms is still more so; for it is a law of morbid poisons that their secondary affections do not necessarily yield to the same remedies as their primary phenomena. It is plain, therefore, that mercury, the great agent in the cure of the primary symptoms of syphilis, is not necessarily efficacious in the cure of the secondary symptoms. In the treatment, therefore, of the secondary symptoms the early practitioners exhausted the whole pharmacopœia; and the modern French still employ a vast variety of remedies, so much so that Jourdan has dedicated a whole volume to their consideration; and even the formulæ of Desruelles, one of the last published works on syphilis, embrace no less than sixteen pages. The English school of medicine, however, has not been able to discover the beneficial effects of any other medicines in the cure of these forms of the disease than mercury, sarsaparilla, and, very recently, the iodide of potassium; the latter remedy, according to Drs. Watson, Clendenning, and others, having been first recommended for the treatment of this class of disease by Dr. Williams, of St. Thomas's Hospital.

Treatment of the Syphilitic Diseases of the Skin.—When the syphilitic poison falls on the skin, the many different diseases it excites require many different remedies and modes of treatment. In the course, then, of this class of affections we are obliged to employ all the three agents that have been mentioned, or mercury, sarsaparilla, and the iodide of potassium; and even these are not, in all cases, efficient.

Of all the syphilitic papular eruptions, the *lichen syphiliticus simplex* is the most intractable by medicine. The iodide of potassium does not appear to influence this form of disease, and when treated by mercury or by sarsaparilla either separately or together, it often continues many months. The liquor hydrargyri oxymuriatis, applied as a lotion night and morning, produces a much more decided effect, and without affecting the general health of the patient.

The *lichen syphiliticus agrior*, or that form of lichen which has a tendency to ulcerate, is much more amenable to medicine, and readily yields to a course of blue pill, but is little influenced by the iodide of potassium.

The *prurigo syphilitica* is said by Rayer to require cinnabar fumigations; probably sarsaparilla is a more efficient remedy.

Of the squamous eruptions, *lepra syphilitica* is almost as intractable as the lepra vulgaris, and only occasionally yields to the internal uses of sarsaparilla or of mercury, or of both conjoined. The liquor hydrargyri oxymuriatis, used as a lotion, however, greatly facilitates the cure.

The forms of *psoriasis syphilitica* are efficiently treated by dressing the part with the unguent. hydrargyri nitrico-oxydi. If combined with diseased bones, the iodide of potassium must be exhibited also.

The treatment of the *exanthemata syphilitica* is extremely simple. The *roseola syphilitica febrilis* readily yields in about a week or ten days to saline medicines, attention to the bowels, and a milk diet.

The *roseola syphilitica annularis* usually rapidly declines when treated by the iodide of potassium; but if the disease be neglected, a copper colour for a long time marks the spots which have been the seat of the eruption.

The *purpura syphilitica* sometimes yields to mercury or to the iodide of potassium; occasionally, however, these cases are most rebellious to every remedy, antisyphilitic or otherwise. One case which had resisted mercury, the iodide of potassium, and sarsaparilla, at last gave way to a treatment of five grains of iodic acid three times a day.

Of the *pustular forms of the cutaneous diseases.*—Ecthyma syphilitica having the phlyzaceous pustule often yields to sarsaparilla, but appears aggravated by mercury. A case of this form of corona veneris was treated with remarkable success by the iodide of potassium grs. viij. ter die, the sore being dressed with the unguentum hydrargyri nitrico-oxydi.

The only form of *vesicular* eruption in syphilis is *rupia*, a disease which requires much judgment in its treatment. The other cutaneous affections little impair the general health of the patient, but the tendency of this disease is so debilitating as rapidly to reduce the powers of the strongest man. Mercury in any form or quantity, exhibited internally or introduced by inunction, is highly dangerous and improper. Many cases treated even by small doses of mercury have terminated fatally, and large doses have been still more unsuccessful. There is one mode of treatment, however, which appears uniformly to succeed, or by dressing the sores with the unguentum hydrargyri nitrico-oxydi, and by supporting the patient either by sarsaparilla or the iodide of potassium, and the latter medicine is infinitely more beneficial than the former. But neither the sarsaparilla nor the iodide of potassium, although singularly successful in restoring the health of the patient, possess the property of healing the rupial sore. The practice, therefore, is first to remove the scab or crust by a poultice, and then to dress the sore with the unguentum hydrargyri nitrico-oxydi, and at the same to give the iodide of potash in eight-grain doses three times a day out of camphor mixture; and the combined effects of this treatment in curing this disease is quite remarkable. If sarsaparilla be prescribed, the patient must, in addition, be supported by wine or porter, or both.

The *Tubercular Syphilitic eruptions* readily yield to small doses of mercury, or to the iodide of potassium, but more certainly to the former. The broad tubercular eruption, or *tubercula syphilitica plana*, is often intractable, especially when it ulcerates. In these cases an ointment of the iodide of potassium, a drachm to the ounce, or the unguentum hydrargyri nitrico-oxydi, are useful applications; but under every mode of treatment the cure is long and protracted.

The *herpes preputialis* yields to any slight astringent lotion, as, a solution of half a grain of acetate of lead to an ounce of water, or to an application of zinc ointment.

For the cure of the cutaneous excrescences or growths, the remedies are almost as endless as the forms of disease. They may be removed by the knife, ligature, or by cauterization, or they may be destroyed by savin powder, by the liquor plumbi acetatis, by the tinct. ferri muriatis, the liquor hydrargyri oxymuriatis, or by acetic acid. The iodide of potassium and mercury, by inunction, have also been found useful in dispersing these adventitious growths. Ricord recommends sprinkling the parts with calomel, having first washed them with the chloruret of soda. Under every mode of treatment, however, these growths have a great tendency to return.

Treatment of the Syphilitic affections of the bones.—The treatment of the syphilitic affection of the bones and of the periosteum has hitherto been the " questio vexata " of syphilis. Some pathologists have contended that this class of disease will heal under a simple antiphlogistic treatment, but there is no sufficient evidence of this result, for long intervals have frequently elapsed, especially in seamen, from the first commencement of the affection before any medical treatment has been employed, yet without any mitigation or appearance of subsidence of the symptoms. The affections of the bones of the nose and of the palate are seldom painful, and the applications for advice in these cases are often long delayed. But the longer the delay the more aggravated and serious the disease, and the greater the chances of disfiguration and of exfoliation. It must be concluded, therefore, that without the aid of medicine the number of victims from this class of disease would be distressingly large, and their sufferings indescribably severe. Happily, however, we are provided with efficient remedies against these great evils in mercury, sarsaparilla, and more especially the iodide of potassium; and it will be seen that all these remedies are necessary in the cure of diseases of the bones.

In the cure of the hard periosteal node the properties of sarsaparilla are so doubtful that its exhibition in these cases is generally abandoned as inefficient or useless. It is admitted, however, that many cases of hard nodes will yield to mercury when given in such doses as to affect the system. Still there are many others in which this metal produces no such successful result, for although the patient is generally relieved as soon as ptyalism is established, yet the pathological state of the parts often remains unchanged; so that on the salivary discharge ceasing the pain returns, and the patient is doomed to many years' excessive suffering, or is only relieved during the time that he is under the fullest influence of mercury. It is painful even to reflect on the ceaseless agony under which these patients have often been seen to suffer. " Pain," says Mr. Carmichael, " is a mild term to express their tortures." It is impossible to determine with any accuracy the number of cases in which mercury is inefficient, but it must be large. Ricord states, " that mercury, only occasionally useful in the primary affection, is incontestably so in the secondary affections, as those of the skin, and again loses its curative properties in the tertiary accidents, or those of the bones." This, perhaps, is in excess, but there is no good writer on syphilis, from Ambroise Paré to Desruelles, who has not proposed cutting down on the intractable node, and destroying it either by actual cautery or by the hammer and chisel. A more efficient treatment of this affection was necessary, and the discovery of the virtues of the iodide of potassium as its surest antidote forms an epoch in the treatment of syphilis.

Indeed it appears to be clearly and irrefragably demonstrated that this salt is the great specific remedy in the cure of this form of secondary syphilis. Nor can the action of quina be considered more certain or more striking in the cure of ague than that of the iodide of potassium in the cure of the hard syphilitic node. Its effects in some hundreds of cases have been, with one exception, to remove the pain in a very few days; and, if the node be recent and the parts not extensively disorganized, to permanently cure the patient. It is only in the old chronic node, and when extensive morbid growths have formed, and such as we may now reasonably hope never to witness again, that the iodide of potassium has failed in effecting a permanent cure. In these cases of confirmed disease mercury is equally inefficient as a curative remedy, and never affords the relief that the patient in every instance receives from the iodide of potassium, and which generally lasts for a considerable time.

On comparing this new mode of treatment with that by mercury it has these advantages:—The relief from pain by mercury is seldom complete till the mouth is fully affected, while under the use of the iodide of potassium the patient is usually free from pain in three or four days, and almost constantly so within a week. Again, mercury often appears to aggravate the disease, and always impairs the constitution. On the contrary, the iodide of potassium has in all instances alleviated the disease, and the rapidity with which this class of patients increase in flesh and in strength is quite remarkable. The iodide of potassium also is useful in a much larger number of cases, and effects the cure without that train of disgusting circumstances which accompanies ptyalism, or that enlargement of the cervical glands, so common when mercury is used. The absorption also of the morbid growth is more certain, and the frequency of relapse diminished, while the cure is obtained in a much shorter time, and consequently at much less expense to the patient both of his constitution and of his purse. On all these grounds, therefore, the iodide of potassium must be considered as infinitely superior to mercury in the cure of this once formidable disease.

The iodide of potassium has been given in doses of 15, 20, and even 30 or more grains; but this is in excess, and generally produces headache, vomiting, and purging. Some constitutions, on the contrary, are offended even by one or two grains. The average dose, therefore, of the iodide of potassium has been found to be eight grains three times a day, and even this often causes three or four motions in the 24 hours. A smaller dose can hardly be recommended, for the patient's sufferings require immediate relief, and consequently we ought to begin with as large a dose as his stomach will probably bear. Eight grains, then, is the mean dose for an adult, and as it usually gives relief in three or four days it is plainly efficient. Some practitioners are in the habit of adding half a grain to a grain of pure iodine to the iodide of potassium; but supposing iodine to act in proportion to the quantity absorbed, and not by its mere acridity, this is a great medical error, for it disorders the stomach without in any sensible degree benefiting the complaint. It is determined, for example, that the iodide of potassium contains three-fourths of its weight of pure iodine; so that a patient taking 28 grains of the former in the course of 24 hours takes no less than 21 grains of the metal. The addition then of half a grain to a grain in the 24 hours of pure iodine is so trifling that it may be neglected; while its acridity is so great that Mr. Stone, of Christ's Hospital, formerly assistant apothecary at St. Thomas's Hospital, states, he used to be called to prescribe for 10 patients taking the compound of iodine and of the iodide of potassium for one that was taking the latter medicine only.

The modes of action of iodine cannot of course be ascertained; but it is absorbed, and perhaps has an affinity for the syphilitic poison, which it modifies, and deprives of a part of its power to inflict disease. Metallic iodine is supposed to be taken up by the absorbents, as hydriodic acid, the metal combining with the hydrogen of the fluids of the stomach. The iodide of potassium is probably absorbed in substance, and so rapidly, that iodine may be often detected in the urine within ten minutes after the patient has swallowed it. It is also found in the saliva, in the tears, in the milk, and probably in the other secretions of the body; but it has not been satisfactorily demonstrated in the blood, being either so rapidly removed as to exist only in quantities too minute for detection, or else resolved perhaps into its elements. The time that it may be detected in the urine, after it has ceased to be exhibited, is not yet determined; but in two cases no trace remained after forty-eight hours. It is remarkable that iodic acid, though a solid substance, is not detected in the urine, even after being exhibited in doses of six or eight grains, three times a day, for a considerable length of time, pointing either to a singular relative affinity of the lacteals for different medicinal substances, or supposing the substance to be absorbed, that it must be removed by some other organ or tissue than the kidneys. The iodic acid has likewise no similar property of curing the syphilitic node with the iodide of potassium. The best means of detecting the iodide of potassium in the urine, is first to add a solution of starch, and then a small quantity of a solution of chlorine. This latter agent immediately setting free the iodine, which combines with the starch, and produces the usual beautiful violet or indigo tint.

The quantity of iodide of potassium necessary for the cure of the hard node is probably in proportion to the pathological state of the part. Some patients, freed from their pains, ask to be dismissed at the end of a week, or before an ounce can have been taken. In general, perhaps, a month is about the average time of treatment, and the quantity used varies from four to six ounces; but when mercury has been previously and unsuccessfully employed, the quantity has sometimes exceeded a pound. It is singular that the hard node, although it is often permanent on the lower extremities, is almost always absorbed when seated on the upper extremity.

The hard node sometimes suppurates, and this form of periostitis was formerly frequent. This change in the pathological state of the parts requires a different treatment, and demonstrates the truth of the remarkable law, that when inflammation terminates in abscess, the remedy which, timely administered, would have prevented so untoward an event, now loses all its power over the disease, and even aggravates the symptoms. As soon, therefore, as the node runs into suppuration, mercury ceases to be in any degree beneficial, while sarsaparilla seems to be the specific remedy. It is probable, however, that the iodide of potassium also will heal, or beneficially influence, this state of the node; at least the iodide of potassium greatly relieves the pain, and apparently accelerates the healing of the part.

The *hard cranial node*, although having the same external characters as the hard node on the long bones, it has been shown, has an entirely different structure, and consequently some doubt might be entertained whether the same medicinal agents would be found equally beneficial in this class of cases. Experience, however, has shown that they have exactly the same powers. Mercury often removes them, but they often suppurate, and have a great tendency to relapse under that treatment. The iodide of potassium, however, gives more certain and quick relief, more readily occasions absorption, prevents ulceration, and in fact cures the disease. When the node has suppurated, either sarsaparilla or the iodide of potash will heal it; but the two remedies combined are perhaps the most efficacious. Again, should the node have ulcerated, the iodide of potash, either *per se* or aided by the ung. hydr. nitr. oxydi, effects, even in this state, the cure.

Syphilitic inflammation of the *substance* of the long bones may exist *per se*, or may co-exist with the hard periosteal node. It has no diagnostic symptoms by which it can be distinguished from the hard node, except perhaps that the bone is more generally enlarged, the pain greater, and the disease more intractable. As long as the inflammation is limited to the superficies of the bone, or to some portion of the cancellous structure, or merely causes some modification of the medullary matter, it probably yields either to mercury or to the iodide of potassium. When, however, an abscess forms in its substance, exfoliation must of necessity take place; all specific remedies lose their power, and opium is the only mode of procuring relief. As soon, however, as the diseased portion of the bone is detached, sarsaparilla appears to facilitate the formation of granulations, and under its use the part heals.

The *soft gelatiniform* or *gummy* node is a disease of much less frequent occurrence than the hard, or even the suppurating node, and is indeed but rarely seen. These nodes are rarely cured by general treatment, or by mercury, or by sarsaparilla. Neither does the iodide of potassium satisfactorily influence them. Cullerier has proposed, while they are yet incipient, to attack them by blisters or a caustic solution, and states he has often succeeded. Ricord also praises this mode of treatment. One patient who had lost the use of his right arm from pressure on the nerve by one of these tumors, whom every treatment was unsuccessful, mentioned that his sister had been operated on for a node similarly situated, and that she had died.

When the syphilitic poison has fallen on the bones of the nose, palate, or face, neither mercury nor sarsaparilla, though continued for many weeks, have appeared to interrupt the course of the disease, or to prevent exfoliation. Still, in quite the incipient stage, the iodide of potassium has often fixed the loosened bones and cured the patient. As a general rule, however, in the advanced stages, this medicine, although it improves the general health, has no power over the affected part, and it is necessary to combine with it a local treatment. When the bones of the nose, therefore, are affected, the iodide of potassium should be exhibited in the usual manner; but at the same time the black wash should be injected twice or thrice a day up the nostrils; or, what is better, the interior of the nose should be anointed with the unguentum hydrargyri nitrico-oxydi, as far as the probe can reach. This latter mode of treatment is uniformly successful, and always saves the nose, and consequently the patient from being disfigured. When the bones of the palate are affected the general and local treatment are the same, but the unguentum hydrargyri nitrico-oxydi should be applied more cautiously to the ulcerated part, on account of its being readily removable by the tongue.

Treatment of Syphilitic Angina.—The treatment of mild cases of syphilitic angina, whether the tonsils be or be not swollen, is by moderate doses of mercury, as of the pilulæ hydrargyri gr. v. bis vel ter die, or even by sarsaparilla. But in severe cases these remedies, however judiciously administered, will not cure the disease, but, on the contrary, often aggravate it; and it is essential that the attention of the student should be drawn to the value of local remedies in this affection. The treatment of these severe cases is to prescribe eight grains of the iodide of potassium ter die, which, without having any power to heal the throat, will greatly support the strength and improve the health of the patient, and in addition to this the ulcerated portions, as far as they can be reached, should be touched night and morning with the unguentum hydrargyri nitrico-oxydi, and under this treatment the ulcers readily granulate, and the throat rapidly heals.

Not only will the deep-eating ulcer heal under this local treatment, but also the superficial and intractable serpiginous ulcer, and the number of cases successfully treated in this manner is now very large, and quite sufficient to establish the great value of this practice. The best mode of applying the ointment is by a piece of lint, attached to the end of a pencil. As a general principle it is seldom that mercury, applied in this manner, affects the mouth; but in two or three instances it has had that effect, and in each instance there was an immediate extension of the pharyngeal ulceration, showing that the amelioration is occasioned by the local stimulus, and not from any constitutional affection of the system.

Treatment of Syphilitic Ophthalmia.—The cure of syphilitic ophthalmia, whether the inflammation affects the conjunctiva, the iris, the cornea, or all of these parts, is by mercury, which is the great specific and only remedy in these cases, for neither sarsaparilla nor the iodide of potassium appear to have the slightest influence in controlling the disease. In every case therefore of *acute* syphilitic ophthalmia mercury should be given in such quantity as to ensure the patient's mouth being affected in a few days. For this purpose, two grains of calomel twice or thrice a day, or five grains of calomel every night, are in general sufficient. Some authorities prefer the proto-ioduret of mercury to calomel, yet it seems unimportant by what means salivation is produced. When the mouth is affected the pains and inflammation in general subside. In a few cases, however, a considerable chronic conjunctivitis remains, which is best treated by the unguentum hydrargyri nitrico-oxydi, applied locally to the eye.

Many writers recommend, in addition to mercury, that blood-letting, both locally and generally, should be had recourse to, and that to a large amount. But this practice appears altogether unnecessary, and must in many cases be highly injurious by favouring the action of the poison on a debilitated system. Blisters have also been recommended, and are occasionally of service, but are seldom essentially necessary. The circumference of the orbit, and also the mucous membrane of the nose, is, by many practitioners, smeared with belladonna ointment; but there is seldom any necessity even for this application.

When the syphilitic ophthalmia is *chronic*, an alterative mode of treatment is often sufficient. A gentleman whose sight was considerably impaired by the deposition of a considerable quantity of lymph on the cornea, was directed to take five grains of the pilulæ hydrargyri every night; and under this treatment the nebulæ in a few days disappeared, although the constitution was not in the slightest degree affected.

Treatment of syphilitic affections of the joints.—When the poison falls on the ligaments and synovial membranes, these diseases are in most cases obstinate of cure; but, as a general principle, the affections of the elbow-joints readily yield to the iodide of potassium. Of the other joints it is difficult to determine whether they yield more readily to small doses of mercury, or to the iodide of potassium. The latter, however, should first be tried. One gentleman who has paid much attention to the effects of the iodide of potassium in these cases, says, "Respecting the treatment of the affections of the ligaments, with considerable swelling of the joints, very much resembling rheumatism, the iodide of potassium is an invaluable remedy. It produces good nights, reduces the swelling, and promotes the general health."

In the foul wards the patient often asks for it, and it is frequently successful.

Dietetic Treatment.—Mr. Hunter taught, that "the manner of living under a mercurial course need not be altered from the common;" but it has been found that a dietetic treatment so much overlooked by Mr. Hunter greatly influences the cure, and that the healing of the primary sore by the unaided efforts of nature is hardly to be obtained except by adopting an exceedingly severe regimen, or the "cura famis." The influence of a dietetic treatment is, therefore, strongly marked in the case of syphilis.

The "cura famis," as the term implies, consists in limiting the patient to an extremely low diet, to confining him to the house, and also to using some trifling local application. Desruelles says he found that the mean duration of a number of cases of primary sore, treated by the "cura famis," limited to a vegetable diet, was thirty days; while a similar number of cases, treated on the same plan, but allowed animal food, was fifty days. He found also a similar difference when mercury was used; for the mean duration of a limited number of cases treated by mercury, and limited to a vegetable diet, was forty-four days, while when animal food was allowed it was fifty-six days. Ricord agrees with Desruelles, that, as a general principle, animal food ought to be avoided in the cure of primary syphilis; but adds, that in feeble constitutions he has often seen the worst consequences from its adoption, and that it is, consequently, often necessary to give the patient the support of an abundant and liberal diet.

In the cure of the secondary symptoms, the patients are generally impatient when limited to a milk or vegetable diet, and perhaps iritis is the only disease in which a forbearance from animal food is absolutely necessary. In rupia, in sloughing sore throat, and when the patient is broken down by severe affections of the bones, a full diet of animal food, with a liberal allowance of wine and porter, appear greatly to facilitate the patient's recovery. In very severe cases, it should be added, there is no greater restorative than change of air.

Preventative Treatment.—When a party has been exposed to infection, there is no other preventative remedy than extreme cleanliness. The chlorides have been recommended, but they probably have no power to neutralize the poison. Still, supposing them to possess such a property, yet the application of these, or of the bichloride of mercury, or of any other substance, must, under any circumstances, be too late to prevent the absorption of the poison, and, consequently, the contamination of the system.

Of the Poison of Gonorrhœa.

Gonorrhœa is a contagious disease, producing a specific suppurative inflammation of the mucous membrane of the urethra and glans in the male, and of the mucous membrane of the genital organs in the female. It occasionally also affects the mucous membranes of the eye, and of the rectum.

The history of the first appearance of gonorrhœa is extremely obscure, and in the absence of all evidence connecting this disease with the remoter periods of medicine, two hypotheses have been entertained—first, that it prevailed prior to the introduction of syphilis; and again, that it was first observed about half a century after the breaking out of that disease. The strongest and most conclusive arguments are supposed, however, to favour the first hypothesis.

Remote Cause.—The combination of causes which produced this poison in the human subject are entirely unknown. Many physicians have thought, with Ricord, that any acrid or irritating discharge in the female would cause this disease. "But how many men," says Beaumés, "know their wives, or other women, when affected with leucorrhœa so acrid as to excoriate the thighs of the parties, or even when labouring under the discharge of incipient cancer, without ever contracting gonorrhœa; yet if these same women become faithless, their husbands are immediately infected."

Whatever may be the source of this poison in its habits, it seems peculiar to man; for Mr. Hunter says, "I have repeatedly soaked lint in matter of gonorrhœa, and introduced it into the vagina of bitches, into the vagina of asses, and under the prepuce of dogs, without any effect. I have also made incisions under the skin, and it has only produced a common sore."

Predisposing Causes.—In general the more feeble the health of the party, the greater the susceptibility, and the longer the duration, of the disease.

It appears *climate* has an influence in the occurrence of gonorrhœa; for, by the returns of the British army, that disease is much more frequent among the troops stationed in this country than in the Mediterranean and the West Indies. The infrequency of gonorrhœa among the inhabitants of warmer climates is owing, perhaps, to the practice of more frequent ablution, and, consequently, to greater cleanliness. According to the records of the Hôpital de Vénériens, at Paris, this disease is greatly more frequent in spring and autumn than at any other seasons of the year, perhaps owing to the holding of a greater number of fairs and festivals at those periods.

Contagious.—The evidence of the contagious nature of this disease is of the strongest description—namely, the constant contamination of a healthy person having intercourse with a diseased one. In a very few instances, the contagious nature of this disease has been proved by a voluntary application of the poison to the urethra in the male, for the purpose of settling this disputed question.

Fomites.—The possibility of this disease being communicated by inoculation is a sufficient proof of this fact; but the transmission by fomites is extremely rare.

Susceptibility not exhausted.—It is probable that the susceptibility to the poison of gonorrhœa is never entirely exhausted, although it has many degrees. The most general maxim is, that the first gonorrhœa is the most severe, and the succeeding ones become milder and milder, till in some cases the danger of infection almost vanishes.

Co-exists.—The poison of gonorrhœa is capable of co-existing with many other poisons. It occasionally happens that the discharge becomes most profuse in the latter stages of typhus fever, while in the earlier ones it may stop altogether. It frequently also co-exists with erysipelas, and probably with every other disease known to depend on a morbid poison.

Modes of Absorption.—This poison is absorbed by all the mucous membranes it is usually brought in contact with; and, reasoning from all analogy, must infect the blood before it produces its specific action; and if we admit orchitis, and some cutaneous eruptions, to be secondary actions of the poison, and not the mere effect of sympathy, this law appears satisfactorily proved.

Period of Latency.—The time which elapses after contamination before the discharge is established, varies considerably in different persons; but every period between six hours and six weeks has been mentioned as the period of latency. In general, however, it is from three to twelve days.

Pathology.—The theory of this disease, as deduced from analogy, is that the poison of gonorrhœa is absorbed by the mucous membranes, and infects the blood; and after a given period of latency, produces suppurative inflammation of the mucous membrane, to which it has been distinctly applied, whether of the urethra and glans in the male, the genital organs of the female, or of the rectum, nose, lip, or eye of either sex. It is probable that this poison has only one secondary action, or on the testicle, when it produces in a given number of cases orchitis. Many authors, however, have attributed a slight inflammation of the fauces, and also certain slight cutaneous eruptions, to this poison; but the proofs are at present insufficient to establish this doctrine. Bubo is probably the result of sympathy, and stricture of local inflammation.

The following are the parts in the male and in the female which it more commonly affects:—

Parts primarily affected in the Male.

Urethra	producing	Gonorrhœa.
Glans Prepuce	,,	Gonorrhœa spuria.

Parts secondarily and accidentally affected in the male.

Testicle	producing	Orchitis.
Inguinal glands	,,	Bubo.
Tissues of the urethra	,,	Stricture.

Parts primarily affected in the female.

Vulva Vagina Urethra	separate or combined	producing Gonorrhœa.

Parts secondarily and accidentally affected in the female.

Inguinal glands	producing	Bubo.
Uterus	,,	Uteritis.

The discharge resulting from the inflammation is in either sex a white, yellowish, or greenish pus, according to the state of health of the patient and the duration of the disease, and is sometimes mixed with blood. It is likewise alkaline, and possesses the other usual chemical properties of ordinary pus. It was formerly supposed to proceed in the male, from ulceration of the urethral membrane, but subsequent observation has shown as a general law, that gonorrhœa arises from a suppurative inflammation of the mucous membrane of the urethra, without breach of surface, and that ulceration occurs only in a few rare cases.

It is generally supposed that in gonorrhœa the inflammation of the mucous membrane of the urethra is partial, and Haller, Mr. Hunter, and others have limited its extent to the fossa navicularis, or the portions immediately under the glans. But Boyer and Cullerier consider that the redness found in the anterior portion of the urethra after death is caused solely by the part being pendent. The fact also that extensive suppurative inflammation often exists in mucous membranes, without any redness being discoverable after death, renders Mr. Hunter's opinion rather questionable, especially as the pain in the perinæum, and the formation of stricture commonly in the bulbous part, show that the remoter parts are oftener inflamed.

The inflammation of the mucous membrane of the urethra frequently extends to the surrounding tissues, or to the cells of the corpus spongiosum, so that they often become bound down by adhesive inflammation, and the phenomena of chordee are the consequence; small tumors also sometimes form in the course of the urethra, and which may suppurate and burst, either into the cavity of the urethra, or externally; and sometimes in both directions, so that a false passage is the consequence, and hence fistula in perinæo.

When gonorrhœa is chronic, the urethra is not unfrequently the seat of *stricture.* The formation of stricture is as follows. When the canals of the body, as the intestines or œsophagus, are inflamed, the affected part contracts, and while thus contracted they often become bound down, and thus their diameter is greatly diminished. According to Mr. Hunter, stricture of the urethra is seldom of greater breadth than if the part had been surrounded with a piece of pack-thread; but, occasionally, the urethra has been found contracted for more than an inch. A stricture may form in any part of the urethra, but the most common seat is about four and a half inches from the origin of the glans, and again at between six and seven inches, or just behind the bulb. They are usually slow in forming, and sometimes thirty to forty years have elapsed from the time of the patient suffering from gonorrhœa to the formation of a stricture.

The mucous membrane covering the strictured portion is sometimes natural in its appearance; at others a little thickened, and occasionally the surface is abraded and ulcerated. The two last effects are generally produced by attempts to pass an instrument, which sometimes causes false passages.

When the gonorrhœal inflammation is violent and long-continued, the prostate has become acutely inflamed, and has even suppurated.

A swelling of the testicle or orchitis is a frequent occurrence in gonorrhœa, but so few persons die of this affection, that its pathology is little known. The epididymis, the cord, and the vas deferens, however, are the parts first attacked, while the body of the testicle subsequently enlarges, and sometimes acquires a very considerable magnitude. If the disease continues, lymph or serum is thrown out, and from the latter cause hydrocele often occurs. The left testicle is more frequently affected than the right, and it is only occasionally and rarely that both are affected.

Another occasional effect of gonorrhœa is bubo, or inflammation of the inguinal glands, and which may terminate in induration with enlargement, or else in suppuration.

In the *female* the vagina is usually the principal seat of gonorrhœal inflammation, and some authors contend that it is confined to this part, but there are cases in which pressure on the meatus urinarius produces a flow of pus, the vagina being in no degree affected. These parts, therefore, may be either separately or conjointly affected. When the vagina and urethra are alone diseased, nothing is to be seen externally; but on separating the labia, we observe some inflamed points, which are the orifices of enlarged mucous glands. In severe cases, the parts both external and internal are more or less swollen, and also the membrane enveloping the clitoris; and this inflammation sometimes extends to the neck of the uterus, causing exquisite pain. When the irritation is great, one or more small abscesses form occasionally in the cellular tissue of the labia.

In chronic gonorrhœa the appearance of the parts is often natural. Mr. Hunter states he had frequently examined patients who complained of the usual symptoms, as increased discharge, pain in making water, and soreness, and yet could perceive no difference between these parts and such as were quite healthy.

In the female, stricture of the urethra is extremely rare, but it is not uncommon to find caruncula or polypus in the interior, or at the orifice of the urethra, causing great pain, and often keeping up the discharge till their removal, either by excision or by cauterization.

According to Ricord, gonorrhœal ophthalmia always proceeds from the direct application of the matter of gonorrhœa to the eye, producing ophthalmia in the highest degree. As early as the first or second day, the conjunctiva, as well as the internal surface of the eyelids, as also the globe of the eye, is gorged and swollen, so as to form a considerable prominence, and give an appearance of the cornea being depressed; and this salient state of the conjunctiva is considered by Lagneau as almost peculiar to this form of ophthalmia, and its diagnostic symptom. From the first moment of attack light is painful, and the secretions of the eye resemble in every respect the yellow-greenish discharge of urethral gonorrhœa, and so acrid that it inflames those parts of the cheek and nose over which it flows. The eyelid now becomes swollen, and the tumefaction of the conjunctiva excessive. In bad cases, the cornea also becomes nebulous, or ulcerates, and procident staphyloma follows, so that the humours of the eye escape, and blindness is the inevitable consequence; a result which may take place in four or five days, and has been known to occur in twenty-four hours. In the majority of cases, however, the ophthalmia is chronic, and the patient recovers without any disorganization of the eye.

Symptoms.—Gonorrhœa may be acute or chronic; and in the male there are two varieties of this disease, or gonorrhœa and gonorrhœa spuria.

Acute gonorrhœa in the male is the discharge of a purulent matter from the urethra. Its first symptom is generally an itching about the orifice of the urethra, which some authors have described as not disagreeable; and this usually comes on about forty-eight hours after contamination. At the end of three or four days it becomes distressing, the lips of the urethra become red and swollen, and pain is now felt on passing the urine, which increases till it becomes so intense as to be termed scalding; the patient finds walking and riding difficult and painful. This inflammation extends also to the glans, which is swollen, tense, and according to Mr. Hunter resembles "a ripe cherry." The parts are now often sore, greatly distended, and at night often intolerably so; and frequently attended with *chordee*. Occasionally the inflammation extends to the prepuce, and causes phymosis or paraphymosis.

The discharge usually begins a few hours after the titillation or itching. It is first a semi-transparent fluid which glues up the orifice of the urethra, and then, about the sixth or eighth day, and often sooner, a puriform matter flows in considerable abundance from the urethra, and which may be white, yellow, green, or any other variation of colour or of consistency common to pus.

The inflammatory symptoms are usually at their height about the fourteenth day, and continue so till the twenty-fifth or thirtieth, when the pain diminishes; the parts become less irritated, and the discharge becoming less and less abundant at length disappears. Such is the usual course of gonorrhœa; it may, however, be much milder or much more severe. In general, gonorrhœa does not terminate till the thirtieth or fortieth day; but in a few instances it ceases in a few hours; while in others it is prolonged for many months. In the latter case it is termed a *gleet*. The matter of gleet is supposed to be non-contagious; but this doctrine is dangerous, and is probably the cause of frequent infection immediately after marriage.

When the disease is complicated with *bubo*, the inguinal glands are swollen, sore to the touch, and sometimes acutely painful, although they do not usually suppurate.

A swelling of the *testicle*, or *orchitis*, is frequent in gonorrhœa, and is calculated to occur in one of every three cases. This affection may take place at any stage of the disease, but is most common towards its decline, and usually coincides with a diminution or entire suppression of the gonorrhœal discharge. When the testicle inflames the patient suffers excessive pain in the part extending to the back, loins, and pelvis. The stomach and bowels also generally sympathize, and nausea and even vomiting are common symptoms. After being inflamed it is generally a long while before the swelling of the testicle entirely subsides, but by degrees it diminishes, and from being much harder becomes even softer than natural; and many years may elapse before the epididymis regains its natural texture.

The disease termed *gonorrhœa superficialis vel spuria* consists of an inflammation of the membrane covering the glans penis and inner surface of the prepuce, followed by a purulent discharge similar to that from the urethra. The glans and prepuce are commonly greatly swollen, red, and painful, and their surfaces are sometimes superficially ulcerated. In this latter case, the extensibility of the glans being much greater than that of the prepuce, phymosis or paraphymosis may take place, and, in some instances, the constriction has been so considerable as to produce gangrene and sloughing of the entire penis. When sloughing attacks the glans, it usually begins in the fossa or root of that part, or at the insertion of the prepuce.

When the *female* is affected with gonorrhœa the vagina is often alone attacked, and this part not being endowed with much sensibility, the pain is trifling. When, however, the disease extends to parts more painful than the vagina, as the inner surface of the labia, the nymphæ, clitoris, caruncula myrtiformis, and meatus urinarius, the parts are so sore and painful as not to bear to be touched; the patient can hardly walk, and great pain is experienced when the urine comes in contact with the inflamed surfaces. The parts affected are also often greatly swollen, so that we can hardly introduce the finger into the vagina; and the discharge is so acrid that it excoriates the parts over which it flows. In some cases the bladder sympathizes, and produces, as in men, the same irresistible desire to void urine, the same micturition, and sometimes the same retention. The inflammation also sometimes affects the mucous glands, producing hard swellings of the inner surface of the labia, which occasionally suppurate and produce small abscesses in the vagina.

Women also very often labour under chronic gonorrhœa without any suffering, and consequently often communicate this disease without knowing that they are themselves diseased, and no more difficult question exists in medicine than to determine whether they are or are not affected. "The kind of matter," says Mr. Hunter, "gives no assistance in distinguishing gonorrhœa, for it often happens the discharge in fluor albus puts on all the appearances of the venereal matter, and an increase in the discharge is no better mark by which we can distinguish the one from the other. The appearance of the parts also gives us but little information; for I have frequently examined those who confessed all the symptoms, as an increase of discharge, pain in making water, soreness in walking, or when the parts were touched, yet I could see no difference between them and sound parts. I know," he adds, "of no other way of judging in these cases where there are no symptoms sensible to the person herself, but from the circumstances preceding the discharge, and the connexions she may be supposed to have had with other diseased persons."

Gonorrhœal ophthalmia is very marked in its symptoms, and is always accompanied with great pain and intolerance of light.

Treatment.—The treatment of gonorrhœa in the male is either by medicines which are supposed to have a specific action on the parts, or else by general treatment. In the former, the object is to cure the disease in a few hours: in the latter, the disease is allowed to run its course, which is commonly from five to six weeks, the practitioner only interfering to obviate symptoms.

Among the specific remedies is the balsam of copaiba. This medicine is considered to be a species of turpentine from which may be distilled a volatile oil, leaving a pure resin as a residue. The balsam, however, is supposed to be more efficacious, and to sit more easily on the stomach than either of its component parts. The dose, in the last pharmacopœia, is described as being from a scruple to a drachm; but the medicine has been employed in much larger doses both in this country and on the continent. Monteggia and Fuller have given from two to three drachms for a dose, while Ribes found, in consequence of a mistake made by a patient, that it might be given to the amount of one or two ounces; and he has prescribed it in this dose in every stage of gonorrhœa, and even when accompanied with swelled testicle, bubo, and gonorrhœal ophthalmia; and he gives many instances of swelled testicle cured by these large doses. Rossignol also states that he cured upwards of 300 cases in less than a week by one to two drachms a-day. These practitioners gave the balsam pure, or mixed with syrup, or mucilage, or yolk of eggs, or with powdered sugar, or else directed it to be taken swimming on the top of a glass of wine or of lemonade, or taken out of an effervescing draught.

This medicine, however, thus exhibited, often makes a most disagreeable impression on the stomach, so that, by many patients, it is constantly rejected. MM. Velpeau, Brettoneau, and Labat have, consequently, given it as an enema dissolved either in mucilage or yolk of egg in doses varying from ʒ j. to ℥ j. a day, and added to it laudanum to cause it to be retained. Velpeau found this method produce its best effects between the fourth and seventh day, and that, after the eighth or tenth day, it either entirely succeeded or entirely failed.

It has been proposed to render copaiba more palatable by solidifying it by gradually mixing with it $\frac{1}{16}$th of its weight of calcined magnesia; by which process, at the end of a fortnight, it acquires the consistency and transparency of gum, so that it can be made into pills; whereby much that is disagreeable both in its taste and odour is avoided. Copaiba, however, is so much the more efficacious as it is exhibited in a liquid state, that unless the vomiting or purging which it sometimes induces requires an adjuvant, it should be administered without combination; and, with this view, it has lately been enveloped in capsules, which have rendered it less distasteful, but perhaps not so entirely as has been generally imagined. When copaiba is given by the mouth, it should not be taken till three or four hours after eating, else it produces great disturbance of the digestive organs; and many patients therefore generally prefer taking this medicine night and morning. It is singular that persons who take copaiba for the first time, especially out of spirits, often find it pleasant to the taste. The first eructation, however, destroys the illusion, and gives an entire disgust to what they had found so pleasant.

Copaiba has been known as a remedy for gonorrhœa since the year 1702, and that it will cure many patients must be admitted. Still it often fails: sometimes makes everything worse, and no one can tell the cases in which it will or will not succeed. Mr. Hunter thought so little of this remedy, that he affirms "there is no specific antidote for gonorrhœa;" "that treatment is seldom of any kind of use, perhaps not once in ten cases;" and, upon the conviction that every gonorrhœa cures itself, he adds, "I gave certain patients pills of bread, and the patients always got well, but some of them, I believe, not so soon as they would have done had the artificial methods of cure been employed." Ricord says that it seldom stops the discharge on the instant "*d'emblée;*" or, should the discharge rapidly cease under its use, it often re-appears on discontinuing the medicine, and again disappears on resuming it,—so that to obtain a durable effect, the patient must continue its use for eight or ten days after the cessation of all discharge. Ricord conceives the best chances of success are, to exhibit it during the first four days from the first appearance of the disease, or else after the acute stage is passed. This eminent surgeon, however, is so little satisfied of its specific properties, that he recommends our applying twenty, thirty, or forty leeches to the perinæum in every case where pain is present, before we exhibit the copaiba. Another of his methods also is to introduce an armed bougee to superficially cauterize the urethra, or else a graduated injection, beginning with a quarter of a grain of nitrate of silver to an ounce of water, and gradually increasing it till some effect is produced.

Another substance has been for some years used for the specific or abortive treatment of gonorrhœa, or cubebs. This medicine is admitted to offer much fewer chances of success than copaiba; indeed it seldom stops the discharge at once. It is singular that a substance so powerfully pungent should be taken in many cases throughout the whole disease without apparently influencing its course. These are the means we possess for attempting the cure of gonorrhœa by a specific or abortive treatment.

Daily experience, however, shows that gonorrhœa often terminates spontaneously, and without the aid of medicine; and its usual course, when the patient is continent and abstains in a great measure from animal food, from wine, and from strong exercise, is to attain its height in about a week; to continue in this state about a fortnight, and then gradually to decline, so that at the end of five or six weeks the disease terminates. In ordinary cases, therefore, it will be plain that, although much prudence is necessary, still that much medicine is not essential. A general treatment is consequently often substituted for the specific, and the usual method is some gentle purgative to slightly act on the bowels, as the sulphate of magnesia or the iodide of potassium. Mr. Carmichael recommends an addition of the solution of tartarized antimony to the former salt; that medicine, preventing "the patient from indulging a good appetite, lessens inflammation, and is the best preservative against painful erections or chordee." In the second stage. if it should be thought necessary, he directs, and it is the practice of the profession generally, the use of copaiba in as large doses as the stomach will bear, or else of cubebs; but the latter medicine, he states, has in the majority of cases disappointed his expectations.

There are many persons, however, who prefer an entirely local treatment, or are induced to conjoin some local measures with the general treatment. The simplest practice is, as soon as the discharge appears to direct the patient to steep the penis in moderately hot water for a few minutes, or till a degree of faintness is produced, and to repeat this fomentation two or three times in the twenty-four hours. This mode of applying heat is exceedingly exhausting, and if the disease be indolent often removes it in a few hours.

A treatment by injections, however, is more practised; and the forms of injection are without number, every practitioner thinking, or wishing to make the world think, his own the best. Some venture to throw up one so powerful as to be composed of ten grains of nitrate of silver to an ounce of distilled water. Ricord recommends a graduated injection, beginning with a quarter of a grain of nitrate of silver, and gradually increasing the quantity till some decided effect is produced. He also recommends the acetate of lead, or the tinct. opii. Mr. Carmichael recommends half a grain to a grain of the oxymuriate of mercury in six or eight ounces of lime-water, or from two to four grains of the sulphate of zinc or of the sulphate of copper in the same quantity of rose or other distilled water. But formulæ for injections are without number.

Mr. Hunter's direction for using injections ought never to be forgotten. "I think," he says, "irritating injections should never be used when there is much inflammation, especially in constitutions that will not bear a great deal of irritation. Nor should they be used when the specific irritation has spread beyond the specific distance; nor when the testicles are tender, nor when the discharge ceasing quickly they have become sore; nor when the perinæum is very susceptible of inflammation, especially if it has formerly suppurated; nor when there is a tendency in the bladder to irritation, which is known by the patient having had for some time a frequency in making water. In such cases I have not succeeded with them; they not only do no good, but frequently do harm, for I have seen them make the inflammation spread further in the urethra, and I think I have had reason to suspect that they have been the cause of abscess in perinæo. But in cases that are mild, and in constitutions that are not irritable, injections often succeed, and remove the disease almost immediately. The practice, however, ought to be attempted with caution, and not perhaps till milder methods have failed. Emollient injections are the most proper applications; and where the inflammation is very great indeed, we often find that a solution of gum-arabic, milk and water, or sweet oil will lessen the pain and other symptoms when the more active injections have done nothing, or seemed to do harm."

When injections are had recourse to they should be used cold, and thrown up three or four times a-day with a moderate force. The patient should seat himself on a chair, introduce the pipe, and then pressing the lips of the urethra gently, allow the injection to run down the canal. As soon as the discharge is stopped the injection should be left off.

In spite of the above local and general treatment the discharge may continue, and the disease, after a few weeks' duration, is now termed a gleet. The cause of the continuance of the discharge is supposed to depend on some irritation of a limited portion of the urethra: This point is sometimes situated towards the meatus urinarius; at others towards the bulb; and, according to Beaumés, in eight out of ten cases towards the prostatic portions of the canal. In this state of parts this gentleman recommends a catheter to be passed, in order to determine the exact distance of the prostatic portion by ascertaining the point at which the urine does not flow. He then withdraws it, and, introducing an armed catheter, cauterizes the affected part. Ricord carries this practice still further, and cauterizes the whole urethra. When the diseased portion is in perinæo, much advantage has been derived from a few leeches, or from a blister.

When the *testicle* becomes inflamed and enlarged in this disease, quiet and a horizontal position are essentially necessary. The patient should also be placed on a low or milk diet. The medical treatment consists of the application of fifteen, twenty, or more leeches, according to the severity of the attack, to the scrotum, and, on their falling off, fomentations or a linseed poultice should be applied, to encourage the bleeding and to assuage the pain, and when the pain is excessive forty to sixty drops of tinct. opii may be sprinkled over the surface of the cataplasm. This treatment often gives relief in a few hours; but should the pain recur the leeches should be repeated, and in all cases the patient should either foment night and morning, or repeatedly change the poultice. Besides the local treatment, internal medicines are of essential benefit, and of these the iodide of potassium is perhaps the best, and eight or ten grains given three times a day often greatly accelerates the cure. When mercury is given it should be in alterative doses, and with or without the sulphate of magnesia, according to the state of the patient's bowels. Under this treatment the disease is speedily mitigated, and generally subsides in ten days or a fortnight. In some cases, however, from improper treatment, or from other cause, the testicle remains much enlarged and greatly indurated. In this state an ointment, composed of a drachm of the iodide of potassium to an ounce, should be gently rubbed over the affected testicle night and morning. The iodide of potassium also taken internally, in the usual dose, still continues to be the most valuable remedy under these circumstances.

Should *chordee* exist in any severe degree, it is important to assuage the sufferings produced by this state of parts, and, besides cold to the part, the most powerful remedy is ten grains of camphor combined with one grain of opium, in pills or as an enema. Ricord states that this treatment is asked for every day in the wards of the hospital by those patients who have already made trial of it.

In the treatment of gonorrhœa in the *female* it is generally admitted that the specific treatment by copaiba or by cubebs is entirely inert, or only useful when perhaps the urethra is affected. In general, then, the treatment of gonorrhœa in females is extremely simple, or by rest, low diet, and diluents, and especially by a weak solution of the nitrate of potash and frequent warm ablutions, or emollient injections, or, should the bladder be affected, a large cataplasm may be applied over the abdomen. In addition to these means, the bowels should be kept freely open, and, if the symptoms be extremely severe, some blood may be taken from the arm, or locally by leeches, as may be thought best.

When the acute stage is passed, astringent injections may be had recourse to, and Ricord recommends the acetate of lead or alum, in the proportions of an ounce to an ounce of distilled water, and, by the aid of injections and of pledgets steeped in these solutions, he estimates that sixty women out of a hundred are cured in the space of twenty days to two months. In still more chronic cases the injection often requires to be varied, and those of the sulphate of zinc, of oak-bark, or of hydrargyri oxymuriatis are among those most commonly substituted. In cases where granulations have formed, or a slight ulceration exists at the orifice of the urethra, the diseased portion should be cauterized with the nitrate of silver or other escharotic.

Emollient fomentations and injections should be used warm, but astringent injections should be used cold. They should be thrown up by means of a syringe with a bent pipe, terminated by a bulb pierced with holes, and the pipe should be of that length that it may be introduced into the vagina without hurting the neck of the uterus. The position of the patient is not indifferent, and she should be recommended to inject in bed with the pelvis raised.

In the treatment of *gonorrhœal ophthalmia* in either sex the means must be active, and any hesitation in their employment, says Ricord, "frequently occasions loss of sight." If the patient be strong, blood should be taken from the arm, and twenty, thirty, or forty leeches should be applied on a level with the alæ of the nose and in the course of the jugular vein, but carefully avoiding the eyelids. Many practitioners now content themselves with applying emollient poultices, but Ricord recommends that the eyelids be inverted and the palpebral, as well as ocular, conjunctiva be cauterized with argentum nitratum until the surface is whitened; and this being done, cold water should be injected, so as to wash the nitrate of silver off the conjunctiva and cornea. As soon as this slight operation is finished, the eye is to be covered with compresses steeped in a cold decoction of poppy-heads, and this cauterization may be repeated every day or every second day. Should ecchymosis exist, he recommends the affected part to be removed by means of hooked tenacula and the curved scissors.

The treatment of stricture, and of diseases of the prostate resulting from gonorrhœa, is so completely within the province of surgery that the reader is referred to the popular works on that branch of medical science for the methods usually employed in these cases.

Of the Poison of Hydrophobia.

Hydrophobia is a simply contagious disease, originating in certain animals, and propagated by their bite. The action of this poison is principally on the brain and eighth pair, causing a peculiar dread of swallowing fluids, which is the characteristic symptom of the disease. Fifteen deaths from this cause are reported to have occurred in England and Wales in the year 1830.

Much speculation has been entertained, whether hydrophobia is of such antiquity as to be mentioned in the writings of Homer; but all authors are agreed that it was known as a disease affecting both the human subject, and also animals, to Aristotle, and subsequently to Celsus, to Pliny, and to Galen.

Remote Cause.—Hydrophobia originates in animals of the canine and feline races, as the dog, the fox, the wolf, the jackall, and the cat, probably from atmospheric causes, but from what peculiar source is altogether undetermined. It is, probably, at all times to a certain extent endemic, and occasionally epidemic among these animals. It has been supposed that it is excited in them by the great heat of the dog-days, or by the æstus veneris; but Troillet has shown that canine madness occurs with nearly equal frequency in winter, spring, summer, and autumn. The poison is not peculiar to any country, for hydrophobia is found equally in Europe, Asia, and America; neither is it limited to climate, since it prevails in the frozen regions of Canada, as well as in the East and West Indies. The difficulties attending the origin of this poison are at present not to be surmounted; but hydrophobia once originated in the animals that have been mentioned, they have the power of producing it by their bite, not only in each other, but probably in all warm-blooded animals, certainly in all domesticated animals, as the horse, the elephant, the sheep, the ox, even in the common fowl, and also in man. Happily, neither man nor any of those animals who are only liable to it in consequence of inoculation by the poisoned bite, are capable of further propagating the disease. It will be necessary, to the proper understanding of hydrophobia, to give a short outline of it as it occurs in the dog, so constantly associated with us in domestic life, and the principal source of the disease in the human subject.

The symptoms of this formidable affection, as witnessed in the dog, are some singular departure from his ordinary habits, such as picking straws or small bits of paper off the floor, and swallowing them, also licking the noses of other dogs, or other cold surfaces, as stones or iron. Besides this, he is observed to be more lonely, shy, and irritable; is less eager for his food, or refuses it altogether. His ears also, and his tail, drop; his look is suspicious and haggard; and sometimes, from the very commencement, there is a redness and watering of the eyes. In a short time saliva begins to flow from his mouth, he "slavers," and his fauces are said to be inflamed, and he is feverish. The animal, though highly irritable, and easily provoked, still obeys the voice of his master, and it is remarkable, says Mr.

Youatt, "that the dread of fluids, and even the sight of them, so striking a feature in man, is often wanting in dogs and other animals, for many dogs lap water during the disease." In many dogs the symptoms never rise higher than these, but in others there is a repugnance to control, and a readiness to be aroused to extreme rage on the appearance of a stick, whip, or other instrument of punishment, or on any attempt at intimidation, which strikingly characterizes the disease. Even in this state, however, he seldom fights a determined battle, but bites and runs away; still even this mitigated irascibility usually ends in indiscriminate aggression, till at length he dies, and apparently of convulsions.

Examination of the dead body has often shown that the animal has died from mere nervous excitement and functional derangement; for Majendie has inspected the hydrophobic dog, and found nothing. In all cases, however, in which the poison has had time to set up its specific actions, the principal lesions of structure are found to be in those parts supplied partially or entirely by the eighth pair; for the tongue is swollen, the fauces, the salivary glands, and the angle at the back of the larynx behind the epiglottis, is also occasionally inflamed. The bronchial membrane is also occasionally inflamed, and so is also the mucous membrane of the stomach, which generally contains a strange mixture of straw, hair, hay, horse-dung, and earth, showing the peculiar morbid propensity of the animal; or being void of those substances, contains a fluid resembling the deepest coloured chocolate. Such are the symptoms and phenomena of hydrophobia in the dog, the chief source, perhaps, of this fatal malady to the human race.

Predisposing Causes.—The susceptibility of the human subject to this poison is by no means universal, for only ninety-four persons died of one hundred and fifty-three bitten, making the chances of escape as three to two nearly. It has been thought this occasional immunity does not arise out of any want of susceptibility to the action of the poison, but from the party having been bitten through his clothes, and the dog's tooth, consequently, having been wiped clean from all venom. Menières, however, says he met with seven cases in which the dog must have bitten through several folds, and yet they all proved fatal; showing, as he imagines, the little importance of dress as a protection from this malady.

Neither age nor sex are exempted from hydrophobia, for the infant at the breast, as well as a man aged seventy-three, have equally died of this disease.

Contagious.—The proof of this law is, that no instance is known of man being affected with hydrophobia, unless antecedently bitten by a rabid animal, capable of communicating the disease.

It is a question of much moment, whether the saliva of a patient labouring under hydrophobia will or will not communicate the disease. It may be stated as an undeniable fact, that during the many hundred years hydrophobia has been studied, that no instance is known of this disease having been communicated from one human being to another, although many instances have occurred of the attendants having been bitten, or otherwise accidentally inoculated with the saliva of the hydrophobic patient. The only instance which makes this law at all questionable is a case given by Majendie, in which he inoculated a dog with saliva taken from a diseased patient, and the dog shortly afterwards died of hydrophobia. But the previous state of the health of the animal had not been ascertained, and as all similar experiments made to prove this fact had failed, it may be presumed that had greater precaution been used, no such sinister accident would have resulted.

Fomites.—The dog's tooth is distinctly a fomes.

Co-exists.—No instance illustrative of this law at present exists.

Modes of Absorption.—This poison is probably absorbed equally by the cutaneous and mucous tissues, but probably an abrasion is necessary. The ancients were aware of this, for Celsus observes that the integrity of the lining membrane of the mouth is necessary to the operation of the psylli, whose office it was to suck out the poison after the bite of a rabid dog; and Dioscorides expressly orders them first to wash their mouths with astringent wine, and afterwards to lubricate the cavity with oil. With regard to dogs, Mr. Meynill observes that "such of them as have been thought to become affected merely by the contagion of the same kennel, will generally be found upon minute examination to exhibit the marks of bites, though concealed by the hair." When a scratch or other abrasion exists, a rabid dog merely licking the part is sufficient to infect the patient.

Period of Latency.—In the human subject, after the poison has been absorbed, it lies in latent combination with the blood from a few days to twelve or more months, the average period being about six weeks. At the Veterinary School at Alfort, it is the practice, when a dog has been bitten, to chain him up for fifty days, and at the end of that period, if he continues in health, he is restored to his master, not that he is now considered as absolutely exempt from danger, but that his chances of escape are greatly increased.

Pathology.—The theory of this disease is, that the poison is absorbed and infects the blood, and that after a period more or less long, produces functional derangement of the brain and nervous system, and subsequently organic alteration of the structures principally supplied by the branches of the eighth pair.

The action of the poison in the first instance is on the œsophageal branch of the eighth pair, producing that derangement of function which gives rise to the characteristic symptom of the disease, or to the extreme difficulty of swallowing, especially of fluids; while the spasmodic catching of the breath, consequent even on touching the lips with any liquid, proves that the recurrent nerve is equally affected. Subsequently, the eye and ear become distressed by every ray of light or impulse of sound, and likewise the sense of touch is most painfully excited, on the slightest breath of air passing over the surface of the body, all of which distinctly show that the central and spinal nerves must be functionally affected. In a still more advanced stage, the suspicion, the irritability, the violence, and generally the outrageous and uncontrollable derangement of mind which often seizes the patient, bringing on epilepsy and convulsions, show that the brain itself is likewise a principal seat of the action of this terrible poison. These symptoms are often so violent as to cause the death of the patient; and the bodies of many persons have been examined, in whom not a trace of inflammation or other morbid phenomena have been discovered; and, consequently, hydrophobia is essentially a disease of function. More commonly, however, some structural alterations have been found limited to slight inflammation of the brain, the chord, or of their membranes, and also of the lungs or stomach, structures supplied by the eighth pair. Still the law of election prevails in this disease, and the brain, the lungs, or the stomach, may be either separately or conjointly affected—facts in no degree dissimilar to what have been observed in hooping-cough, fever, and in many other diseases caused by morbid poisons.

It is doubtful, however, whether the actions of the poison end here, for in a case treated by Majendie, and prolonged beyond the usual period, suppuration of the synovial membranes of the joints took place, and produced a state of suffering remarkable even in this frightful disease, and far more terrible than death itself. Such organic lesions as have been found are as follows:—

When the membranes of the brain have been found diseased, the appearances have been great congestion, especially of the plexus choroides, also effusion of serum into the arachnoid cavity, and also into the ventricles. The brain has also in some very few cases been supposed to be harder or softer than usual, and also to have more bloody points than in health. The mucous membrane of the pharynx and œsophagus have also been met with, either greatly congested, or diffusely inflamed, as also that of the stomach, and of the trachea and bronchi. The latter also have been found covered with a considerable quantity of frothy mucus, while the pulmonary tissue has shown marks of inflammation, though more commonly only of great congestion. The salivary glands have likewise occasionally been observed increased in size and vascular. The chord has been supposed by some pathologists to be the great and specific seat of the hydrophobic poison, and its substance as well as its membranes has been found congested; but still few cases are on record in which any traces of inflammation were discoverable. This state of parts, therefore, is merely owing perhaps to the incessant violence and struggles of the patient, and might have been predicated *a priori.*

Symptoms.—The wound inflicted by the bite, whether neglected or dressed, generally heals up kindly, leaving a cicatrix, and for a time the patient usually suffers no other derangement of health than the depression of spirits which his apprehensions are calculated to excite. A few weeks or a few months having elapsed, the latency of the poison terminates, and the disease is formed. The course of this affection is usually divided into three stages; the first stage comprising the symptoms which precede the difficulty of swallowing; the second commences with the difficulty of swallowing, and terminates with the overthrow of the mind: the last stage embraces all the concluding phenomena.

The first stage commences in a few instances by the patient's attention being aroused by a pain felt in the cicatrix, sometimes severe and sometimes trifling, and which shoots up the bitten limb, following in general the course of the nerve towards the heart. Pain, however, is by no means constant, and is for the most part absent. In the latter case, the first symptom is chilliness, with headache, or a slight attack of fever, and the patient is more excited or depressed than usual. These premonitory warnings last but a few hours, or at most a few days; when the fatal but characteristic symptom, "the difficulty and dread of swallowing," a symptom which distinguishes this malady from all others, appears, and the hydrophobic stage commences.

The second or hydrophobic stage is ushered in with a great difficulty, if not an utter impossibility, of swallowing any liquid, a symptom which generally comes on suddenly; and such horrible sensations accompany that effort, that whatever afterwards even recalls the idea of a fluid excites violent agitation and aversion. Some patients who have been able to give some account of themselves, describe the hydrophobic sensation as a rising of the stomach, which obstructs the passage, others as a feeling of suffocation, or a sense of choking, which renders every attempt to pass liquids over the root of the tongue not only impossible, but also excites convulsive action in the muscles of the larynx, pharynx, and abdomen. In this state, says Dr. John Hunter, "the patient finds some relief from running or walking, which shows that the lungs are not yet the seat of any great oppression."

The hydrophobia, or inability to swallow fluids, is shortly accompanied by an increased flow of saliva, termed the "hydrophobic slaver." This secretion, as the disease advances, is not only copious but viscid, so that it adheres to the throat, and causes incessant spitting, and the quantity expectorated may be taken as the measure of the violence of the disease.

The aversion to fluids is no sooner established than another series of symptoms of dreadful severity, or a highly exalted state of every corporal sense, is added. Indeed it is hardly possible to depict the sufferings of the patient from this cause, for not only does he shrink at the slightest breath that blows over him, but the passage of a fly, the motion of the bed-curtain, or any attempt to touch him, produces indescribable agony, almost amounting to convulsions. The sense of sight is no less a source of terror than that of touch, for the approach of a candle, the reflection from a mirror or other polished surface, occasions the same distressing effect. The hearing is also as strongly affected as the other senses, so that the least noise, and especially that of pouring out fluids, throws him into a fearful paroxysm. One of the dressers who sat up with a hydrophobic boy, making water within his hearing, threw him into a most violent agitation. The degree to which this painful state of the senses exists may be understood when it is stated Majendie gives the case of a deaf and dumb child, who heard distinctly in this stage. The patient, thus incessantly harassed and pained by every circumstance around him, becomes peevish and irritable, and at length sees his family, relations, and strangers, with feelings of dislike and aversion, and sometimes apparently with horror.

The third stage commences by the cerebral functions becoming disturbed, the mind being either filled with dreadful apprehensions, or else being so completely overthrown, that paroxysms of furious insanity, or fits of epilepsy, follow. In this stage horror is strongly depicted on the countenance, every symptom is aggravated, the saliva grows thick and ropy, while the poor sufferer, not daring to make the slightest attempt to swallow, spits it out incessantly, oftentimes with frequent retching and vomiting. In this state he sometimes turns black in the face, and calling out he is suffocated, falls into convulsions in which he expires, or else, exhausted by his great efforts, a sudden calm ensues, and as if nature gave up the struggle, dies without a groan.

Diagnosis.—When hydrophobia is fully formed, there is no disease with which it can be confounded; but there are many reported cases in which the imagination of a patient bitten by a dog has been so powerful as to similate the disease. In hysteria the difficulty of swallowing exists, but no other symptom.

Prognosis.—There is no instance of any patient or animal suffering from this disease having recovered.

Treatment.—As there is no well authenticated case of recovery from hydrophobia, neither is there any instance, or but rarely so, of any mitigation of the symptoms by the use of medicine. All that remains then is to mention the most leading experiments that have been made, with the hope that, as they have not been successful, they may not be repeated.

Dr. Hamilton gives twenty-one cases, and adds, many hundreds more are on record, in which venesection has been unsuccessful, though copious and often repeated. Opium has been given by Dr. Babington to the enormous amount of 180 grains of solid opium in eleven hours, without the slightest narcotic effect, or the slightest mitigation of the symptoms. Nord has given a drachm of belladonna in twelve hours, without any benefit. Dr. Atterly gave to a child eight years old two drachms of calomel by the mouth, and also had rubbed in two ounces and a half of strong mercurial ointment in a few hours, and with an equal want of success. Iron, arsenic, nitrate of silver, camphor, musk, cantharides, turpentine, tobacco, acetate of lead, cuprum ammoniatum, hydrocyanic acid, galvanism, strychnine, nitrous oxyde, chlorine, and guaco, have been also given in equally large doses, but have signally failed. These include some of the most powerful medicines in the Pharmacopœia; and, in addition to these, Plouquet, in his *Literatura Medica Digesta*, has enumerated nearly 150 others.

The failure of every remedy by the mouth, and the powerlessness even of opium, of morphine, and of laurel water, even when injected into the veins, so convinced Majendie that, in hydrophobia, the constitution was armed against the action of any medicinal substance, that on a patient labouring under this disease being brought to the Hôtel Dieu, he determined to rely for all treatment on an injection of warm water into the veins. The patient at the time of the operation is represented as being absolutesly insane, so as to require to be confined in the strait waistcoat. In this state, and with a pulse of 150, Majendie injected into his veins, in the course of two hours and a quarter, two pints of water at the temperature of 100°. At the conclusion of this operation, the pulse had fallen to 80, and the patient recovered his senses, so that the strait waistcoat was no longer necessary. The sequel, however, renders it doubtful whether this mitigation was desirable at the price of the intense suffering which followed. The poor man lived eight days afterwards, but the despondency and mental agitation quickly returned, and at the end of three days the poison appeared to set up a new series of specific actions on the synovial membranes of the wrists, elbows, and knees, attended with excessive pain, so that he was unable to bear the weight of the bed-clothes, and he died in great torture. The articulations thus affected were found on posthumous examination to be greatly inflamed, and their cavities filled with pus. This case is remarkable, as being the one in which life was prolonged for the greatest period of time recorded of this disease. The experiment has since been repeated by Gaspard and others, but the mitigation, if any, has been so slight and transient as to give no encouragement for repeating it; and tried on the rabid dog by Mr. Youatt and Mr. Mayo, it proved eminently unsuccessful.

The property which some animal poisons have of controlling and of interrupting the actions of other morbid poisons on the constitution, has caused this class of agents to be tried in the cure of this disease. The rapid and powerfully acting poison of the viper led to the hope that the bite of that reptile might prove an antidote to the hydrophobic virus, but the experiment, tried in France, Germany, and Italy, has been entirely unsuccessful. M. Grindard conceived that the vaccine virus might influence hydrophobia, and he vaccinated a hydrophobic child in three places, and afterwards injected five charges of vaccine lymph into the veins, but the child died without any marked remission, and in the usual time.

Preventative Treatment.—In the East Indies, after the bites of the venomous serpents of that country, the patient usually lies speechless and insensible in less than an hour. The probabilities therefore are, that unless the operation of excision, of canterization, or of applying the cupping-glass be performed within a few minutes after the bite of the rabid animal, it is impossible to save the patient from the fatal disease, which, according to the susceptibility of his constitution, now threatens him. In all probability no prophylactic medicine exists in nature, and the exhibition of any potent substance by way of prevention is worse than useless, for without protecting the patient it injures his constitution. Mild remedies, if they tend to tranquillize his mind and to appease his apprehensions, may be innocently employed.

OF THE POISON OF THE PLAGUE.

The plague is a simply contagious disease, generally marked by fever. The more specific actions of the poison are, inflammation of the lymphatic glands, and the formation of carbuncle.

Every epidemic disease of great severity, or of unusual character, was formerly termed "the plague," and considered as belonging to an order of supernatural events; as the infliction of an offended deity to punish the sins of a disobedient people. The long catalogue of calamities which history records under this name consequently embraces every epidemic disease that has fallen on man. Modern medicine, however, restricts the term "plague" to a disease of dreadful severity, and of a peculiar character, which appears to have its origin in Egypt, and in the neighbouring countries, and is unquestionably the result of physical causes.

It is impossible to determine the time when the plague first appeared in Egypt. Some writers consider it to have been coeval with Moses; while others contend that it was unknown as late as the Augustan age, and consequently is of "secondary formation." The remotest period to which we can distinctly trace it is when we find it spreading into other countries; and the plague of Constantinople, which broke out in 544, when Justinian was emperor, is the first which, from its course and symptoms, we can with certainty determine to be the plague of modern times. It was so severe that at one period ten thousand persons are said to have died daily in that city. Procopius has distinctly traced it to Egypt, and states that it spread successively over the whole empire, making its first attacks on the coast, and then spreading into the interior. The symptoms were shivering and fever, at first so slight as to alarm neither the physician nor the patient, but the same day, the next day, or the day after, there appeared swellings of the parotid, axillary, or inguinal glands, with carbuncles, and sometimes gangrene, and from the more usually diseased state of the glands, it was called "pestis inguinaria." These symptoms are those of the Egyptian plague, and nobody can doubt the identity of the two diseases.

The plague, from that period, has raged at short intervals in various parts of Europe, as late as the seventeenth century, so that Sir Gilbert Blane has calculated there were no less than forty-five plagues in the seventeenth century. Fourteen of them occurred in Holland, in consequence, it is supposed, of the Dutch having engaged in the Levant trade, about the year 1612; and twelve in England, imported, as has been supposed, from Holland. The last plague which raged in either of these two countries was in 1665, or the year before the memorable fire of London. This plague was termed the "Great Plague," and spread "with such intolerable infection," that 7165 persons are said to have died in one week, while in one year no less than 68,526 died in the city of London and its suburbs alone; an immense mortality, considering the then comparatively small amount of population.

The plague is still annually epidemic in Egypt, and very constantly rages on the Barbary, Arabian, and Syrian coasts, and also at Constantinople; but has been rarely seen out of the Turkish dominions since the seventeenth century. Nevertheless it broke out at Copenhagen in 1712, at Marseilles in 1720, and at Moscow in 1771. In the present century it has appeared at some of the Russian ports in the Black Sea. In 1813 it broke out at Malta and at Gozo, when the losses it occasioned were estimated at a million sterling, and the number of victims at between 4000 and 5000. It subsequently broke out at Noja in Calabria, in 1816, at Corfu, in 1818, and lastly it appeared at Gussemberg in Silesia, in 1819.

Remote Cause.—The plague, and consequently the poison which it generates, has undoubtedly a very limited origin. Clot Bey indeed considers it to originate, and to be endemic, along the whole of the eastern and southern coasts of the Mediterranean; the principal centres being Egypt, Syria, and Constantinople. But most authors are agreed that Egypt alone originates the plague, whence it is imported into other countries. It seems determined also that the poison is not only generated in Egypt, but also within a very circumscribed space of that country; for Volney states that the plague in Egypt never commences in the interior, but always appears first on the coast at Alexandria, passes from Alexandria to Rosetta, and from Rosetta to Cairo; and consequently he considers that the poison must be generated in the Delta of the Nile, and this fact is confirmed by all subsequent writers.

Of all the causes mentioned by authors as originating the poison of the plague, the crowded state of the population in Egypt, their misery and insufficient nourishment, are the most prominent. Every writer speaks of their mud-built huts, of their narrow and tortuous streets, and of their habitations, whether isolated, in villages, or in towns, being surrounded in every direction with heaps of dung and other immundities. In these the Arab lives with his wives, his children, and his servants, and his domestic animals, all huddled together. "Unheard-of filth," says Clot Bey, "reigns in their infected taudis." Again, some authors have considered the pestilential miasma as a product of vegetable decomposition, favoured by the inundation of the Nile, and the heated blast of the hot Khamsin; others, that it is owing to the mud deposited by the Nile; and lastly, that it is owing to the practice of making mummies of the dead, or of imperfectly and superficially burying them. Clot Bey has examined all these causes, and comes to the conclusion that, taking them conjointly or separately, they are inadequate to account for the origin of the plague. Of the many other hypotheses imagined, the generation of a peculiar animalculæ, flying from place to place, is the most ingenious, and perhaps the most unfounded theory. All, therefore, that we can safely affirm of this poison is, that it is probably of secondary formation, has a local origin, is at all times endemic in Egypt, and every five or six years epidemic. It also appears to be to a certain extent influenced by season, the plague not spreading in any very sensible degree till December, and attaining its greatest height in June, when it rapidly declines, and is popularly supposed to cease on St. John's day.

The period of the year, however, at which the plague prevails differs in some degree in different countries; but the total duration of the disease in any country to which it is not native appears to be inconsiderable, unless kept up by a fresh importation. At Aleppo it lasted from 1760 to 1762, a period of three years. But in Malta, Marseilles, and in the western parts of Europe, it has generally subsided in about a twelvemonth.

We are little acquainted with the habits of this poison as it affects animals. Dogs are said to have died of buboes, either during or just preceding the plague season; and bile taken from a deceased plague-patient, and injected into the veins of a dog, was followed by the death of the animal. Boccaccio says he saw two pigs die of the plague in 1348; and Aubert states he was credibly informed that many oxen had died with buboes during the late plague of Alexandria. Clot Bey, however, is sceptical about all these facts.

Predisposing Causes.—In every epidemy there is only a certain number of persons greatly susceptible of the action of the poison, else every town or city attacked must be depopulated. The proportion of persons, however, liable to be attacked by the plague is very great, for in that of Alexandria, in 1834, it is calculated, out of 42,000 souls, 14,888 perished. In selecting, however, its victims, this poison follows the law of most other morbid poisons, attacking the poor rather than the rich,—women rather than men,—patients labouring under disease rather than healthy individuals,—persons constitutionally feeble rather than the robust, and those addicted to intemperance or other excess than those who more strictly observe the precepts of Mohammed. As to races—the Arab suffers more than the Negro, the Negro than the Turk, and, in Egypt, the Turk than the European.

Contagious.—The belief in the contagious nature of the plague is so general that it still continues to be the terror of Europe, and the ports of every nation are closed against a vessel supposed to have the plague on board. The facts by which this precaution is warranted are extremely striking, for every time the plague has appeared in Christian Europe the arrival of a ship on board of which one or more persons have died of the plague has been an invariable antecedent. The disease also has invariably first broken out at the port or town at which such vessel has arrived, and if the proper precautions have been taken, has not spread, or only in a trifling degree, into the interior of the country. The following modern examples of the plague appearing in the West of Europe will exemplify this statement.

On the 25th of May, 1720, Marseilles being healthy, a vessel arrived in that port from Seyda, in Syria, having lost seven men, during the voyage, of the plague. It was usual to send vessels and their crews arriving under these circumstances, or having foul bills of health, to perform quarantine at Jarn, an uninhabited island near Marseilles; but this precaution was omitted in the present case, and so negligent were the officers on duty, that the captain and passengers were permitted to land, and even to lodge in the city, while the crew were sent to the infirmary and allowed to associate with the persons attached to that establishment. It appears also that many contraband articles were thrown over the walls. In the midst of this free communication one of the seamen died of the plague, then the *garde de vaisseau*, then the cabin-boy and two porters, and lastly, on the 20th of June, the plague broke out in the city itself, and raged with such fury that out of a population of 90,000 souls, it was estimated 39,134 died. It spread in Provence, and caused considerable mortality in that department; but, nevertheless, it was limited to a comparatively small district of country immediately around the original focus of infection.

In the year 1743, Messina being healthy, a ship arrived on the 20th of March from the Levant, and three men having died during the voyage, the ship was put under quarantine in the harbour. Two days after the captain died of the plague, and shortly after another of the crew; when, in consequence of this, the ship, ten days after her coming to anchor, was taken to a distance and burnt, with all her cargo. Forty days after the plague broke out at Messina, when 38,000 persons are said to have died of the disorder.

In the year 1813, Malta being healthy, a vessel called the 'San Nicolo' arrived on the 29th of March from Alexandria. On entering the port she hoisted the yellow flag with a black spot in the centre, the signal of the plague on board; and the master reported two men had died on the voyage, and as he believed of the plague. The same day also there arrived two other vessels, likewise from Alexandria—the brig 'Nelly,' and the Spanish polacca 'El Dolce,' which had likewise lost some men on the voyage.

The arrival of three vessels on the same day suspected of having the plague on board alarmed the city, and the 'Nelly' and the 'El Dolce' were sent away the next day, while the 'San Nicolo,' belonging to a merchant resident in the island, was put under quarantine; and on the third day the captain was seized with symptoms of the plague, and died in thirty-six hours; and his servant was seized about the same time, and he also died. On the 16th of April following, the first death from plague occurred in the city of Valetta; and on the 3rd of July, the disease had spread so extensively that the organization of a police was begun for the purpose of isolating the city and "shutting up" its inhabitants. It is remarkable that although the plague spread to many towns or villages in the island, that no sooner was that town or village surrounded by a cordon of troops, and thus isolated, than the disease was limited to that spot, and never spread in any instance to the troops immediately without it.

It is manifest that the antecedent arrival of a vessel having the plague on board at each of the three ports of Marseilles, Messina, and Malta, and the breaking out of the disease in all those places shortly afterwards, is so remarkable that it can be only explained by admitting the connexion of cause and effect. Moreover, the fact of the plague having originated in the preceding instances from imported contagion, and not from any local influence, is demonstrated by the exemption of large bodies of persons "shut up" in the very heart of the pestilence. Thus, in the plague at Marseilles, the large nunnery of des Dames de la Visitation Sainte Marie "shut up," and, although there was an infirmary on one side, for those ill of the plague, and a burying-ground on the other, for those who died of the plague, yet all the inmates of the nunnery escaped. The Hôpital de la Charité of the same city, a sort of poor-house, making up about 300 beds, "shut up," and escaped with complete impunity; but being converted into an infirmary for the plague patients, 200 of the poor left in attendance all died of the plague. In the plague of Moscow, 1770–1771, the Imperial Foundling Hospital, containing 1400 souls, "shut up," and although more than 100,000 persons are supposed to have fallen victims to this pestilence in that city, yet, except some eight persons who surreptitiously went into the city, and were instantly separated, none caught the disease. The exemption also of the Convent St. Augustin, which "shut up;" of the town of Isola, which "shut up;" and the singular exemption of all the military, "though they surrounded within a yard or two camps and hospitals in which the plague was raging, and, lastly, were subjected to those hard duties which are known to give a predisposition to inflict on soldiers the most violent type of the prevailing disease,—but they never caught the plague at all," are further proofs that the plague was not communicated through the medium of the atmosphere.

Another class of facts demonstrative of the contagious nature of the plague is the greater number of persons attending on or in communication with the sick who fall from the plague. The French army, on first taking possession of Egypt, lost no less than eighty medical officers by the plague, an immense proportion compared with the loss of the army generally. In the English army only one in forty-eight of the army generally died of the plague, while one-half of the medical officers died. On the contrary, in Malta and in Corfu, the medical officers dressed themselves in oil-skin dresses, and, thus protected, often slept in the wards, yet not one of them was attacked by the plague. Some few persons also have ventured voluntarily to inoculate themselves with plague-matter, and these have, with hardly an exception, fallen victims to their rash experiments.

Such is a general view of the facts proving the contagious nature of the plague. It must be admitted this law is doubted by Aubert and Clot Bey; but when we find the Pacha of Egypt and his court carefully "shutting up," and that quarantine establishments are formed at Alexandria and Constantinople, it is impossible not to see that these doubts are not entertained by the higher ranks of the Mohammedans, while it is well known that all the Christians of any fortune in the Levant are such contagionists as constantly to "shut up" on all similar occasions.

Fomites.—By the contagion *per fomitem*, as it is termed, the plague has been supposed to spread, not only from person to person, but from one quarter of a town to another, and also to remote and distant countries. The following are instances of this law.

"In the plague of Moscow," says De Mertens, "the principal victims consisted of the lower order of the Russians, and these bought up everything that was rescued from the flames." When the French army was in the occupation of Egypt there were so many instances of a connected series of deaths from the transmission of a captured pelisse or other article of dress, that Bonaparte ordered all infected articles to be burnt, causing such great destruction of military appointments as to have led to many remonstrances from the officers. The experience of the British army so entirely coincided with that of the French army as to the contagious nature of fomites, that they adopted the same measures. In the plague of Malta Sir Thomas Maitland conceived that disease to have been introduced into the island of Gozo by a person released from quarantine carrying with him a box he had secured in his garden. The belief in the contagious nature of the plague is so general in the Levant, that persons "shut up" usually encage, send away, or destroy all cats and other domestic animals, which they consider as so many living fomes; and in Malta all articles of food were steeped in water for at least half an hour, the wine was delivered in uncorked bottles, and pigeons, fowls, and rabbits when sold were stripped of their feathers or skin, and every particle of hair, wool, or feathers was removed by pincers and burnt. If the dead body also be considered as a fomes, we find that at Malta the grave-diggers and the bearers of the dead suffered in a very remarkable degree. To remove any doubt that might exist on this head, two criminals that had been condemned to death were placed during the epidemy in Egypt of 1834–35 in the beds of two deceased plague-patients, and they both took the disease.

If the doctrine of the contagious nature of fomites can be considered as proved, it is important to determine what length of time the pestiferous miasmata may be preserved in an active state in the substance they adhere to, and modern experience seems to prove that the period is not long. In Egypt and Syria, the day after St. John's day, when the plague has hardly yet disappeared, the clothes of many thousand persons dead of the disease are openly bought and sold in the market-places without any apprehension of infection. Another strong fact is, that the hospital Esbekié, at Cairo, in which more than 3000 plague-patients had been treated, at the close of the epidemy, and while some plague-patients were still left in it, was appropriated to a different class of patients; and, from some neglect of the servants, these persons slept in the same beds, under the same woollen counterpanes, and with no other change than the blankets, and yet no individual caught the plague. It is singular, also, that immediately after the plague of London, "the houses," says Hodges, "which were before full of the dead, were now inhabited by the living, and the shops, which had been most part of the year shut up, were again opened;" and "many went into beds where persons had died, even before they were cold and cleansed of the stench of the disease," and yet it appears there was no evident extension of the disease. Mr. Tully states, that the experience acquired in the plague of Corfu proved that susceptible effects of all kinds can be securely purified by subjecting them to the combined or even individual action of pure air or water, and that the tents employed in the plague-camps, after being washed half a dozen times in salt water and dried in the sun, were delivered into his majesty's stores, and shortly after employed in the encampment of the garrison. A voyage from Egypt is evidently capable of disinfecting all fomites, for no quarantine officer of Great Britain has been infected with the plague since 1665. It almost seems necessarily to follow, that when the plague is imported into any country, the infection or contagion must be renewed by the sickness or death of some portion of the crew during the voyage.

Susceptibility not exhausted.—Dr. Russel states that at Aleppo he met with 28 cases of re-infection, or 1 in 157; and Clot Bey states that he and his colleagues saw many individuals perish of plague in 1834–35 who had formerly survived an attack of the disease.

Co-exists.—It is certain that neither the syphilitic nor any other poison, as far as is known, gives any exemption from the plague.

Modes of Absorption.—This poison being contagious is necessarily absorbed by the skin, and apparently without breach of surface. Many persons are supposed to have been infected by drinking out of a cup after a person labouring under the disease; and, if so, it must also be absorbed by the mucous membranes. There are good reasons, also, for believing that, being once absorbed, it must infect the blood; for the matter of the bubo is infectious, and blood and bile injected into the veins of dogs have destroyed those animals. Another circumstance also which seems to prove the infection of the blood is that pregnant women attacked with plague almost always abort, and, according to Dr. Russel, some of the children have borne evident marks of the disease; while there is no instance of a child born of a plague woman surviving delivery more than a few hours. Clot Bey, however, inoculated himself, and also many dogs, with blood taken from the heart or large vessels of patients deceased of plague, and these all escaped infection, a result perhaps owing to the extremely minute quantity and diluted state of the poison.

Period of Latency.—The period of latency is a question of great moment in treating of the laws of the plague, as being that circumstance which ought to determine the length of quarantine for the person. Dr. Russel states he has known persons long shut up taken ill almost immediately, or in a day or two after coming out of confinement. Aubert also gives the case of a Maltese who was taken ill on the second day after his arrival at Alexandria. The minimum period of latency, therefore, is short. As to the maximum period, Dr. Russel says, "I met with no instance of the disease discovering itself later than the eighth or ninth day." Aubert and Clot Bey seem to have adopted the same opinion. Father Maurizio extends this period to fifteen days; Sir James M'Grigor to seventeen days; while M. Bertrand, from his observations during the plague at Marseilles, places the extreme period at thirty-five days. It is probable, however, that there must be some error in this last observation, and, consequently, that the extreme periods of latency may safely be stated to be from a few hours to twenty days.

Pathology.—The theory of this disease is, that a poison is absorbed and infects the blood, and after a given period of latency produces certain specific actions, which are either preceded, accompanied, or followed by fever. The more specific actions of the poison are an inflammatory state of the brain and its membranes, similar to that of continued fever in this country; also a singular enlargement of the heart, the liver, or of the spleen. But the most constant action of the poison is on the lymphatic system generally,—the cervical, inguinal, axillary, and mesenteric glands being for the most part found enlarged or otherwise inflamed, and thus give rise to the characteristic bubo. The cellular tissue also appears to be often the seat of a specific action of the poison, it being frequently affected with carbuncles; every organ and tissue of the body is likewise covered with petechiæ, and often the seat of hæmorrhagic effusion.

The extreme danger attending posthumous examinations, and the prejudices of the Mohammedans, long prevented our possessing any satisfactory data respecting the pathological phenomena of the plague; but a commission appointed by Mohammed Ali in 1834-35, and consisting of Clot Bey, Gaetani Bey, Lachesi, and subsequently of Bulard, examined the bodies of sixty-eight persons deceased of the plague, and the following is a summary of the results.

On removing the cranium the sinuses were found filled with black blood, the arachnoid veins greatly injected, and the arachnoid cavity often infiltrated with serum, and occasionally with a trifling effusion of black blood. The substance of the brain was generally less consistent than in health, and sprinkled with more bloody spots than usual. The bronchial membrane appeared sensibly inflamed, although during life the patient had presented no catarrhal symptoms. The pericardium frequently contained a reddish serosity. The serous membrane, also, covering the heart and pericardium was often extensively affected with petechiæ. The heart was also distended with blood, and was almost always enlarged, or from a third to a half greater than its natural size; its tissues being often pale, and sometimes softened.

In acute cases the stomach was often natural, but more commonly there was a partial redness of the mucous membrane, like confluent petechiæ; but in more chronic cases it was of a deep red or else of a slate colour. It was also often softened, the seat of superficial ulceration, especially between the folds, and in one case blood was effused. The small intestines, except being the seat of petechiæ, sometimes livid, were rarely found diseased. The ilio-cœcal valve was the only portion of the large intestines found at any time in a morbid state, when its colour was commonly livid, and sometimes ulcerated, the ulcers penetrating occasionally the appendix vermiformis.

The liver was almost always larger than natural, and loaded with blood, while petechial spots were often seen at its surface, and once a sort of pustule was seen on the edge of the right lobe, conceived by some to be a carbuncle. The gall-bladder was the seat of petechiæ, and in two cases blood was effused into the sub-cellular tissue.

The spleen was always twice its natural size, or even more, but was rarely the seat of hæmorrhagic effusion. It was also softened, and deep in colour.

The kidneys were often found immersed in an hæmorrhagic effusion into the surrounding cellular tissue. They were loaded with blood, and the pelves filled with clots. The ureters also occasionally contained blood, and sometimes the lumbar glands were so enlarged as to press upon them and to account for the suppression of urine. The bladder occasionally presented petechiæ, and occasionally the urine was mixed with blood.

Every dissection showed that buboes, wherever seated, always resulted from diseased lymphatic ganglia. These ganglia were always enlarged, and varied in size from an almond to a goose's egg. The least altered were hard and injected. In a more advanced stage, some without any change of colour, and others again as richly coloured as lees of wine, were wholly or partially softened, and some in a state of putrilage. Sometimes these glands became agglomerated and formed masses, some of which weighed two pounds, and around these agglomerations was a hæmorrhagic effusion extending into the cellular tissue. The cervical glands often became so enlarged as to form a sort of chaplet united with those of the axillæ and of the mediastinum. The axillary glands again communicated with the cervical, and with those which surrounded the bronchi. Those in the groin connected themselves in the same manner with those of the abdomen, and these might be traced without interruption through the crural arch into the pelvis and along the vertebral column. It was especially among these latter that sanguineous effusion was found in the sub-peritoneal tissue. The mesenteric glands were often so numerous that the whole of the mesentery seemed covered with them, but they seldom exceeded an almond in size.

The blood, says Clot Bey, is evidently diseased in the plague-patient, although no analysis has shown in what this alteration consists. It is stated never to be buffed; that the serum readily dissolves the colouring matter; and that the lower part of the clot is but feebly coagulated.

Symptoms.—The poison of the plague produces those disordered functions of the great nervous centres which constitute the phenomena of fever, either of a low or of an active character, and sometimes so severe as to destroy the patient in a few hours, and before any secondary actions are set up. "At Aleppo," Dr. Russel says, "in the most destructive forms of the plague the vital principle seems to be suddenly, as it were, extinguished, or else enfeebled to a degree capable only for a short time to resist the violence of the disease; and the form of the plague beyond all others most destructive exists without its characteristic eruptions, or other external marks considered pestilential. These perished sometimes within twenty-four hours."

In milder cases, the fever, of greater or less intensity, is preceded, accompanied, or followed by the secondary actions that have been mentioned. The order of the occurrence of these secondary actions, and the frequency of their accession, is not determined; but buboes, carbuncles, and petechiæ are considered as the characteristic and most frequent symptoms of the plague. Desgenettes thought the symptoms presented three degrees of intensity; so also does Aubert; and this division is also adopted by the *Commission.* The first degree being a slight fever without delirium or buboes; the second degree being fever with delirium and buboes; the third degree, high fever, high delirium, buboes, carbuncles, and petechiæ.

The manner in which the plague attacks is very various. Many instances are given of patients being most suddenly seized, as when conversing, eating, walking, going to bed, or during sleep. Clot Bey, however, thinks cases of this description to be exceedingly rare, more commonly, he says, the disease is preceded for a greater or less length of time by "lassitude, loss of strength, general uneasiness, and mental anxiety, to which soon succeeded shivering, headache, vertigo, and vomiting; then appear the general and local phenomena, and among them bubo, carbuncles, and petechiæ, preceded or followed by delirium or coma, too often terminating in death."

The *first degree* of the plague is when the symptoms have presented only a slight fever, frontal headache, an altered countenance, nausea, and perhaps vomiting; or should this fever be accompanied by buboes and carbuncles, either simultaneously or consecutively, the buboes always terminate by resolution, suppuration, or induration, while the carbuncles, more or less numerous, are always superficial. In this variety the patient rarely keeps his bed, perspiration is readily excited, and the termination is never fatal. This form is common at the height of the epidemy, and is still more so at the decline of the disease.

In the *second degree* of the plague the patient staggers as in drunkenness, has a stupid air, an injected eye, an embarrassed speech; this is accompanied by nausea or vomiting of bilious matters, and often by diarrhœa, while in the last stage the matters vomited are black. There may or may not be heat of the skin; but the pulse is frequent and concentrated, and the delirium tranquil or agitated. The tongue, at first moist, is often white at the centre and red at the edges and tip, but on the second or third day it becomes dry, black, and chapped at the centre, while the teeth are covered with sordes. The secretion from the kidneys also is affected, the urine being always high coloured, at times sanguinolent, small in quantity, and, towards the termination, often suppressed. From the second to the third day buboes appear in the axilla, groin, or neck, and more rarely in the ham, and about the same time carbuncles and petechiæ, and on the fourth or fifth day, in unfavourable cases, the patient dies comatose. The patient, however, may recover, and the convalescence may be either rapid or prolonged. In the former case, about the fourth or fifth day, the tongue again becomes moist, the skin open, the pulse softer, and the buboes either terminate by resolution, suppuration, or induration; the carbuncles, when they exist, limit their ravages, the petechiæ disappear, and about the sixth or eighth day the patient is convalescent. In cases more severe the black tongue and all the other symptoms continue, the buboes are slow to suppurate, their pus is serous and fœtid, and convalescence is not established till the fourteenth to the twentieth day, and during this protracted struggle the patient often sinks. This is the form of plague which predominates at the height of the epidemy, and gradually disappears as it declines.

In the *third degree* every symptom is increased; the hebetude and dulness is accompanied by an almost entire annihilation of the intellect, and by a prostration of strength so extreme that an upright posture is impossible. The pulse, moreover, is small and frequent, the tongue moist, thick, and purple, the petechiæ of a dark colour, and the patient often dies in 24 or 48 hours, comatose, livid, and without agony. If, however, the disease should be still further prolonged, the pulse rises, the tongue is red and dry, the skin hot, the eye injected, and the countenance animated; and towards the third day an eruption of buboes, and occasionally of carbuncles, follows. The patient has now a chance of recovering, but such a result is rare. It is in this variety that buboes and carbuncles are sometimes altogether wanting; and this is that terrible form which prevails almost exclusively in the first month of the epidemy, and is occasionally met with till its termination.

The bubo seldom maturates till the fever is on the decline, which rarely happens till the eighth or ninth day, nor are they ripe for opening till between the fifteenth and twenty-seventh day. In general, says the Commission, suppuration has not been so frequent as resolution, and never were they seen to be gangrened. Aubert considers the bubo as of good augury for the patient, and its suppuration as the sign of his recovery.

The carbuncle is by no means of constant occurrence, Dr. Russel having found it only in 490 cases out of 2700. It appears, says Clot Bey, more commonly in the middle or towards the decline of the disease. Hardly any external part is free from them, not even the penis, and in one instance a carbuncle formed in the throat, which was fatal. They occur more particularly on the limbs, and more especially on the legs. In some cases they form on the cheek or lips, and by the tumefaction they cause give to the face a hideous aspect; in others the whole of one side of the jaw has been laid bare, while in others they have formed on the eyebrow and on the eyelid, and partly destroyed the eye. Clot Bey, however, observed they never formed on the scalp, the palms of the hands, or on the soles of the feet.

According to Clot Bey there are three different varieties, and all commence in the same way, or by a small red pimple, which increases, and in the centre of which a vesicle forms, containing first a yellow and afterwards a blackish serum. In the most benign the vesicle bursts and dries up in three or four days from its first formation, the epidermis alone having been infected. The second variety involves the whole thickness of the skin, as well as portions of the cellular tissue, which is moderately tumefied, and surrounded by a dark red areola. The gangrene in this form is circumscribed, and there results an eschar from one to two inches in diameter, which is detached by suppuration, leaving an ulcer with a sharp perpendicular edge. In the severe forms the redness and tumefaction cover a large space, and the gangrene rapidly involves the skin, the cellular tissue, and sometimes even the bones. It has been observed that the malignity of the carbuncle is in the direct ratio of the severity of the disease, but their mere existence is not of unfavourable augury. Their number is very various, sometimes only one, at others ten or twelve, and Clot Bey gives a case in which more than thirty formed on the thigh and leg, but they were all benign. When there are several they often form in succession. These tumors are often very painful, and Aubert mentions one seated on the back of an Arab soldier four inches in diameter.

Petechiæ are observed in some seasons and not in others. They present their different shades of colour according to the intensity of the disease, or rose-colour, violet-colour, or black. Aubert considered their appearance an almost certain sign of death. The duration of this disease is from a few hours to 15, 20, 30, or even more days.

Diagnosis.—Clot Bey says the diseases which most resemble the plague are typhus, severe forms of paludal fever, apoplexy, dysentery, parotiditis, and scrofulous or syphilitic affections of the ganglionary system.

Prognosis.—Desgenettes calculated that not more than one-third of the French soldiers attacked with plague recovered. In the plague of Marseilles 40,000 are said to have died out of a population of 90,000. At Malta, dividing the months of July, August, and September into two equal parts, 90 in 100 cases died in in the first half, and 60 in 100 cases in the second half. At Alexandria, in 1834-5, out of a population of 42,000 persons, 14,000 are supposed to have perished. Clot Bey estimates the whole mortality for Egypt in that year to be as one in three of those attacked.

Many instances are given of a patient apparently convalescent, and even walking about, dropping down and expiring; but in general, says Clot Bey, cyanosis and partial coldness of the extremities, petechiæ, and the subsidence of the buboes were the grave symptoms. Pregnant women always aborted when seized with the plague, and all those near their time invariably died, and that even when the loss of blood has been inconsiderable.

The favourable symptoms are a quick re-action, abundant sweats, and the suppuration of the buboes.

Treatment.—In the treatment of the plague neither the practice of the French or English medical officers serving in Egypt has led to any happy result. The French first tried rubbing the body with oil in the manner so strongly recommended by Prosper Alpinus, but their frictions only added to the anxiety and apprehensions under which the patient laboured. Cold affusion was then tried, but it caused hæmorrhage; mercury produced diarrhœa; to scarification succeeded gangrene; and to actual cautery increased debility. Bleeding was likewise tried, but was altogether unsuccessful, so that the French medical officers, baffled in every attempt at heroic treatment, at length confined themselves to watching the disease and palliating symptoms, giving antimony on the accession of the fever, and opium in diarrhœa, while they supported the patient afterwards by camphor, æther, bark, or wine.

In the British army a variety of similar or other modes of treatment were tried, but with an equal want of success. Dr. Whyte relied on the lancet, but every one of his patients are stated to have died. Some gentlemen attached to the Brunonian treatment, kept their patients under the influence of wine and opium, but this practice was so little successful that it was abandoned. Mercury and nitric acid were thought more favourably of, but mercury was only useful when it affected the mouth, and it was a general remark that the gums were unusually insensible to the action of this mineral in the plague.

It is to be regretted that recent experience has not in any degree advanced the successful treatment of the plague. "In the beginning of the epidemy," says Clot Bey, "when the morbid cause acts with a rapidity so great that some hours are sufficient to compromise the life of the patient, every treatment, even the most energetic, is powerless to arrest the course of the disease. When, however, the intensity of the disease abates we may hope for the recovery of the patient." Many will attribute this happy recovery to nature, but it can hardly be denied that nature may be greatly assisted by art. But what are the means to be adopted? This question is most embarrassing, for, consult 20 different practitioners, and each will recommend a different treatment. One relies, for instance, on narcotics, another on stimulants, a third is the exclusive partisan of bleeding, while a fourth cures all his patients by purging, or vomiting, or both. The *Commission* state, "We believe every therapeutic means to have been absolutely useless in the plague, but that under the antiphlogistic treatment the largest number recovered."

The treatment of the *bubo* was first attempted by actual cautery or a blister, but the *Commission* appear to have abandoned this mode of treatment, and to have applied emollient poultices as a mode of favouring suppuration and of mitigating pain. As soon as matter was formed they immediately opened the tumor.

The treatment of the *carbuncle*, when benign, was also by poultices. If, however, the slough was deep the part was cauterized down to the living flesh. When the mortification was of great extent, a circular incision was made in the integuments immediately round the tumor, and an iron heated to a white heat was introduced into the furrow. The subsequent dressing was lint steeped in the chlorides, and when the part granulated up it was then dressed with a compress.

Dietetic Treatment.—The diet to be observed in the cure of the plague is very imperfectly laid down by the different writers who have treated on the subject; but no doubt it must be the same as that observed in other febrile disorders, or that the patient should rigidly abstain from all animal food and limit himself to slops and a strictly vegetable diet.

Preventative Treatment.—The preventative treatment may be divided into the measures necessary for the protection of the attendants on the patient; into those which are necessary to prevent the introduction of the plague into any given city; and lastly, into those which should be adopted supposing that disease to have broken out in any town, city, or camp.

The only mode of preventing personal contamination is for the attendants on the sick to clothe themselves in oil-skin dresses, and to avoid all direct contact with the patient or with any article, whether of linen or of any other kind, that he may have touched, or which has been in any way in contact with his person. The atmosphere of a plague hospital was found, both at Malta and at Cephalonia, to be so little noxious that the attendants slept in the wards with impunity, provided they secured themselves from all personal contact.

As to preventing the introduction of the plague into any city to which it is not native, it must be admitted there is no other safeguard than quarantine, and the length of the quarantine should be the longest period of latency, *plus* the time it takes to overhaul the cargo. The longest period determined by Sir James M'Grigor for the latency of the poison is 17 days, while the time taken to unload the cargo may be estimated about four to six days, making the longest necessary period of quarantine to be 21, or at most 24 days.

When the plague has broken out in any city, experience has shown that no half measures are of any avail; that there is no middle course between allowing the disease to take its course and adopting the complete system of isolation followed in Malta in 1813. The mode in which this was effected is as follows: On proclamation of the plague existing, the gates of the town were shut, public business of every kind suspended, the population required to repair to their respective homes, and no person was now allowed to move out except especially employed on the public business. After this the town was divided into small districts (at Valetta there were 24), and a corps of volunteer guards was organized, by the inspector-general of the police, out of the inhabitants. The duty of this corps was, not to move out of their own streets, but to do duty at the doors and windows of their own houses, and thus to prevent all improper communication, and to see that all susceptible articles of food were immersed for half an hour at least in water; that pigeons, rabbits, and fowls were stripped of their feathers and skins; that wine was received in clean uncorked bottles; that all susceptible articles were carefully examined, and all filaments of wool, thread, feathers, &c., removed, by pincers and burnt; that all coins were passed through vinegar; and that all contact with porters, carriers of provisions, or other persons, was carefully avoided. Besides these guards, one deputy and one clerk were appointed to each district, and such a number of sick-searchers and police serjeants as might be required. The duty of the deputy, with the aid of his clerk, was to make out an accurate return of the whole population within his district, and to take care that at the door of each house a list of all persons residing there was affixed, and which list was to be corrected weekly, and a copy thereof regularly transmitted to the inspector-general. It was also the duty of the deputy to call forth the inhabitants of such houses to see that they were in perfect health, and to make a report every three days where no case of sickness occurred, but when such case did occur to make his report instantly to the inspector-general, who was to communicate the intelligence to the proto-medico, that necessary measures might be taken for ascertaining the nature of the complaint. If the disease on investigation was declared to be the plague, the parties infected and the parties suspected were equally sent to the lazaretto, taking with them such articles of value or of furniture as they might wish to save; and the moment they were removed the whitewashers and expurgators, preceded by beat of drum and sound of bugle, so as to warn all parties of their approach, marched to purify, expurgate, and to whitewash the infected house; and in order that there might be no concealment, it was ordered that on no account whatever should a corpse be interred without an antecedent medical examination directed by the proto-medico.

It is hardly possible to conceive that any community, unless strongly persuaded of the contagious nature of the plague, could submit to a system of discipline so severe, and which can be regarded as an evil only inferior to the plague itself.

When the army was in Egypt a minute inspection was made of every corps and of every department twice a week, and any person with the smallest appearance of ill-health was sent to the hospital; also every corps or hospital where a case of plague had appeared was put into a state of quarantine, and of such corps an inspection was made by the surgeons at least two or three times a day, and every case with suspicious symptoms was ordered to the observation tent or room, and on the plague appearing, such case was immediately sent to the pest-house. The men were likewise ordered to bathe frequently, and their clothes and bedding to be frequently washed and baked, while the quarters of the army were frequently changed.

Such are the preservative measures which have been raised as a barrier against the introduction of the plague into Christian Europe. "The dread of contagion," says Dr. Russel, "neither can nor ought to be eradicated from the mind of man."

OF THE POISON OF FARCINOMA.

The horse, the ass, and the mule are liable to a disease termed the glanders; it occurs under two forms, or the glanders and the farcy. Many veterinists have considered these varieties to be distinct diseases, but numerous experiments have demonstrated that they have their origin in one common animal poison. It appears, however, that there are several grades or varieties of both these diseases. Thus, if glanders be defined to be a fever with a running of matter from the nose, farriers distinguish three kinds: one consists of ecchymosis and gangrene, principally of the pituitary, tracheal, or bronchial membrane; another of a pustular eruption of the same parts followed by ulceration; while a third is a combination of these two forms of disease. Of farcy also there are two kinds, or the *bud farcy* and the *button farcy*. The bud farcy consists in the formation of a number of tumors on different parts of the body, as on the head, neck, and extremities, and particularly on the hinder ones, these tumors being formed not only by enlargement and inflammation of the glands, but also of the cellular tissue, and which, at the end of four or five days, soften and ulcerate. Similar tumors are said to form also in the substance of the pituitary membrane, which quickly suppurate and cause death. The button farcy is an inflammation limited to the lymphatic glands and vessels, without involving in any considerable degree the cellular tissue. It usually commences in the hinder extremities, causing lameness and enlargement of the limb; and when the valves of the lymphatics become thickened it forms a tumor called the "farcy bud," while, if the lymphatic vessel itself be inflamed, it is termed "farcy pipe."

The affections which have been mentioned have been supposed to be peculiar to the monodactyles; but it has been determined by a number of severe accidents occurring to persons employed about glandered horses, that the poison producing them is capable of being transmitted from the horse to the human subject, and again from the human subject to the horse, and to the ass, and there is reason also to believe that it is capable of being transmitted from one human being to another. The attention of the profession was first called to this interesting subject by Mr. Muscroft, in the Edinburgh Medical and Surgical Journal, in the year 1821, where he relates the case of the whipper-in of the Bardworth hunt, who wounded himself in cutting up a glandered horse for the kennel, and died at the end of a week of confirmed glanders; and two similar cases appeared in the same work about two years afterwards. These cases excited but little notice till Mr. Travers published his valuable work on Constitutional Irritation, in 1828, containing a letter from Professor Coleman on the transmission of glanders from the horse to man, and from man to the ass, together with some other cases which had fallen under his own observation. The subject was now followed up by Dr. Elliotson, in two papers in the Transactions of the Medical Chirurgical Society, narrating three cases which had occurred in his own, Dr. Roots's, and Dr. Williams's practice. At length all the then known facts were collected in an elaborate paper by Rayer, in the sixth volume of the Mémoires de l'Académie Royale de Médecine.

Remote Cause.—The remote cause of glanders in the horse is but little understood, but it is probably an atmospheric poison, having a peculiar affinity for the horse, and animals of his class. The glanders, however, when they affect the human subject, have in all instances been distinctly traced to the glandered horse as their remote cause, for no instance is known of their occurring primarily in man.

Predisposing Causes.—In the horse certain predisposing causes greatly favour, and are perhaps necessary to the spread of the glanders, as dirty, close, ill-ventilated stables, especially if the situation be low and damp. Horses also, when crowded on board transports, are greatly liable to this affection. Thus the Arab, in transporting his horses from Arabia to India, always chooses that part of the year when the passage is shortest, lest the accidents incident to a long voyage might oblige the hatches to be closed, and want of ventilation give rise to glanders. Bad food is also a powerful predisposing cause in the horse, especially when these animals are picketed on service, and thus exposed to the inclemency of the weather. At the close of a campaign the cavalry is often decimated by this disease, and towards the termination of the Peninsular war, the losses from this cause are said to have been enormous. The cases occurring in the human subject are too few to allow of any inference being drawn as to the influence of the predisposing causes in the production of the glanders, but they have all occurred in young men, and probably a close investigation would have shown that the habits of the patient were such as to fall within those laws which favour the production of the disease in the horse.

Contagious.—The general facts which establish this law in the horse are, that an immense majority of veterinary surgeons, of stable-keepers, and coach-proprietors, believe in this doctrine, and everybody must have heard this class of persons complaining, if a glandered horse has been introduced into their stables, that their stock has almost immediately fallen ill of the disease. There are few districts also in which some farmer, by the loss of a considerable part of his team, has not had sufficient proof of the contagious nature of the glanders. In this country the law is severe against offering for sale, or even working, a glandered horse, which shows that the opinion of our ancestors, time out of mind, has been that the glanders are a contagious and a fatal disease. In Germany the belief of contagion is so general that it is said the law directs any horse that has been in contact with a glandered animal shall be immediately killed. Again, Professor Coleman has produced the glanders by direct inoculation from horse to horse, so also have Professors Peal and Renault, while Leblanc assures us that he has repeated these experiments till he has demonstrated, that not only are the glanders contagious, but that the farcy and glanders are mere varieties of the same disease, the farcy matter producing glanders, and the matter of the glanders farcy.

Cases of the transmission of the glanders from the horse to man are now numerous; and that the disease is actually the glanders has been shown by Professor Coleman, who directed two asses to be inoculated with matter taken from the arm of a Mr. Turner then labouring under this disease, consequent on a puncture received in dissecting a glandered animal, and both animals died of the glanders. These experiments have been repeated with similar results by Gerard, Hering of Stuttgardt, and more recently by Leblanc, with matter taken from a patient that died glandered under Rayer, so that no doubt can exist of the fact. It seems proved, therefore, that the glanders are transmissible from the horse to man, and again from man to the ass. It has been contended also, if the glanders are transmissible from man to animals, they must be capable of being communicated from one human subject to another, and a case of this description appears actually to have occurred in St. Bartholomew's Hospital only a few months ago, when the nurse, a healthy woman, contracted the disease from a patient in the ward, and, after a short illness, died with every symptom of the glanders.

Fomites.—The fact of repeated inoculation with glandered virus distinctly shows that fomites may be so infected as to produce the disease. The spread of the disease also has been attributed to healthy horses having drunk out of the same pail or trough with a glandered horse, or to licking the neighbouring rack or partitions of the stalls in which a glandered horse had been placed. Mr. White attributes the occurrence of the glanders in a mare and two foals to some hay which had been left by a team of glandered horses being blown into their paddock.

Susceptibility exhausted.—The great fatality which has attended this disease has rendered it impossible to illustrate this law.

Co-exists.—The number of cases of glanders which have occurred in the human subject are as yet too few to throw any light on this law.

Modes of Absorption.—The farcinomatous poison has been introduced into the system both by the cutaneous and mucous tissues. Thus glanders have been produced by inserting the virus under the cutis with a lancet, and by rubbing it on the greasy heel of a horse; they have also been produced by inoculating the mucous membrane of the nose of the horse, or else by smearing that membrane with farcied matter. Farcied matter has also been made up into balls, and introduced into the stomach of the horse, and glanders have resulted. There can be no doubt, therefore, that the poison is absorbed both by the cutaneous and mucous tissues, and that being absorbed it infects the blood. This latter fact has been distinctly proved by Professor Coleman, "I have," says this gentleman, "produced the disease first by removing the healthy blood from an ass, until the animal was nearly exhausted, and then transferring from a glandered horse blood from the carotid artery into the jugular vein of the ass. The glanders in the ass was rapid and violent in degree, and from this animal, by inoculation, I afterwards produced both glanders and farcy. In acute glanders, therefore, the blood is undoubtedly affected."

Period of Latency.—The poison of the glanders has its period of latency, like all other morbid poisons, and that period is in general short. Two asses were inoculated by Mr. Turner, the one about a year, and the other a year and a half old, and in the first the maxillary glands became tender on the second day, and the discharge from the nostrils was established on the third. In the other the maxillary gland enlarged on the third day, but the discharge from the nostrils did not take place till the sixth day. Sometimes, however, the incubation is much longer. In the procès-verbal de l'Ecole de Lyon, a case is given of a horse which was inoculated with farcy matter, but the disease did not appear till the end of three months, and then precisely at the points of puncture. M. Gerard, an ex-veterinary surgeon of the French "artillerie de la garde," states that he introduced the matter of the discharge every day, into the nostrils of certain horses by means of a brush, and that the disease appeared in one on the seventh day, but in two others not till the 32nd day.

In the human subject, the poison has in general been latent from two to eight days after the accident of the puncture.

Pathology.—The theory of this disease is, that a poison is absorbed and infects the blood, and after a given period of latency produces in slight cases an abscess at the point of puncture, followed by some tumors in the course of the absorbents connected with the punctured part. In severe cases fever is previously set up, and after this has continued for some days, there follows either a diffuse or an eruptive inflammation of the mucous membrane of the nostrils and of the trachea, terminating in suppuration, ulceration, or gangrene; also some inflammatory affection of the lung, together with the usual farcy button or bud tumors in different parts of the body.

In the cases collected by Rayer, the nose and nasal fossæ had only been examined in four cases out of fifteen, and in these there was found either ecchymosis, ulceration, or gangrene of the mucous membrane of the septum nasi, or else granules in the sinuses. The mucous membrane of the larynx, or trachea, has likewise been found studded either with the peculiar eruption, or else diffusely inflamed or ulcerated, so much so that in one case the epiglottis was in part destroyed. The lungs have likewise been found either gorged with blood, or else the seat of lobular pneumonia, or of vomicæ. In Dr. Roots's case there was an encysted abscess of the lung, which contained about two ounces of pus. Besides these affections of the more vital organs, a number of small farcy tumors have been found in different parts of the trunk, and extremities, and perfectly remote from the point originally punctured. These tumors are in different states of inflammation, some being white and indurated, others soft and injected, and others in a state of suppuration. In Dr. Roots's case, an abscess on the back of the hand communicated with the articulation of the metacarpal bones; and in another case an abscess had opened into the knee-joint. The absorbent vessels have likewise been found inflamed along the arm, from the point of puncture, and the glands to which they lead have been found enlarged and indurated, or in a state of suppuration.

Symptoms.—The glanders may be either acute or chronic. Acute glanders consist of primary fever, followed by local inflammation. Chronic glanders are when the local inflammation exists *per se.* The proportionate number of cases of each kind is not determined.

Acute glanders are ushered in by an attack of primary fever, with or without rigors. This is followed by pains in the limbs so severe as often to be mistaken for an attack of acute rheumatism. Some days after, the pained parts become the seat of phlegmonous tumors, accompanied with much pain, redness, and tenderness; these more commonly terminate in abscess, sometimes discharging a laudable pus, but more usually a bloody sanies, and rapidly become gangrenous. Towards the close of the disease, in 11 out of 15 cases, there has been a discharge of matter more or less purulent, viscid, and mixed with blood, from the nostrils, and in 10 of these cases the discharge was from both nostrils. The quantity, however, has in general been inconsiderable, and sometimes scarcely appreciable. The period at which this symptom appears is not constant, for it has been seen as early as the 4th, and as late as the 16th day. In the course of the disease, also, the eyelids are generally tumefied, and discharge a thick viscid matter, like that from the nose, and an enlargement of the submaxillary gland has been seen in one case.

One of the most remarkable symptoms of acute glanders in man, is the eruption of pustules on the face, trunk, limbs, and genital organs. This eruption has been compared to the varicellæ, to the small pox, and to ecthyma, but in fact is *sui generis*, and cannot be compared to any other. It has been observed to occur about the 12th day, and to be preceded and accompanied by profuse fœtid sweats. Besides this eruption, a number of black bullæ have been observed on the nose, forehead, below the ears, on the fingers, toes, and genital organs, and these have been followed by gangrene, more or less extensive and deep.

The pulse is full and quick in the early stages, but towards the close becomes rapid, small, irregular, and even intermittent. The tongue varies, as in typhus, being first white and coated, and subsequently brown or black. Diarrhœa and meteorism often complicate the disease, and black blood has been observed in the stools.

Cerebral disturbance has come on as early as the second day, but more commonly not till towards the tenth; sometimes marked by a singular want of intelligence, at others by a sinister presentiment, followed by stupor and death.

Acute glanders are rapid in their course, and two thirds of the cases have terminated before the 17th day; two have died on the 21st day, one on the 28th day, and only one has survived till the 59th day.

Chronic glanders, or acute farcy, differs from acute glanders, in the circumstance of the local lesion preceding the general febrile derangement; the introduction of the poison being followed in a few hours by inflammation of the lymphatics, proceeding from the wounded part, and extending sometimes to the elbow or axilla, and involving the axillary glands. This is followed by inflammation, and extensive abscesses in the sub-cutaneous cellular tissue, often involving the whole limb. From this state the patient may recover; but should they be multiplied over various parts of the body, and accompanied either by the pustular or gangrenous vesicular eruptions, or both, the result is generally fatal, for hectic symptoms supervene and hasten the final catastrophe.

The disease has terminated in a fortnight, more commonly has not proved fatal till the end of a month, and in cases still more chronic, a twelvemonth has been known to elapse before the patient finally recovered, or else died. Such are the general symptoms of acute and chronic glanders, as they have been observed in the human subject.

Prognosis.—Of 15 cases of acute glanders collected by Rayer only one recovered. Of 15 cases of acute farcy only five recovered. Of seven cases of chronic farcy only one died. Of the three cases of chronic glanders two died. The only favourable prognosis consequently is in chronic farcy.

Diagnosis.—"Acute glanders," says Rayer, "cannot be confounded with poisoning from puncture in dissecting or opening dead bodies;" for he adds, "out of 50 such cases reported by various authors, no mention is made in them of a discharge from the nostrils, or of a nasal or laryngeal eruption being found after death, or of the peculiar cutaneous eruption." Leblanc also states that he has inoculated the horse with a great number of other morbid secretions from the human subject, but has in no instance produced any disease similar to the glanders. It may for a short time be mistaken for rheumatism, but the occurrence of the secondary actions quickly dispels this error. It is perhaps impossible to enumerate every difficulty that may occur in the diagnosis, but when any doubt exists, an inquiry into the habits and employment of the party will probably solve the problem; or the inoculation of a healthy animal is an excellent counter-proof.

Treatment.—All the remedies hitherto tried in acute glanders have failed, for only one out of 15 has recovered, and that not from any particular treatment. Blood, when taken at the commencement, has been found buffed, and some momentary relief has been afforded, but prostration and stupor have quickly followed, while leech-bites have become gangrenous. The coming on of typhoid symptoms has caused quina, valerian, serpentaria, ammonia, and other stimulating medicines to be exhibited, but all these medicines have failed. Vomiting and purging have likewise been had recourse to; but these measures have been equally unsuccessful. It is probable, therefore, that the cure of this disease depends on the discovery of a specific remedy, and every experiment in treatment is warranted as the only chance of subduing a malady which has so constantly proved fatal. In the more chronic forms of the disease, the recovery of the patient has appeared to be owing to the excellence of his constitution, and to a generous diet, rather than to any powerful effect produced either by general or local treatment.

Preventative Treatment.—The prophylactic treatment is the same as that of all other contagious diseases, or carefully to avoid all contact with the morbid poison, and especially when a finger or other part of the hand is abraded; and if by accident the veterinary surgeon should inoculate himself, he ought instantly to touch the part with lunar caustic. It has been recommended, after the disease is set up, to extirpate the enlarged glands; but if there is any truth in the doctrine that the blood is poisoned in this disease, and that the local affections are the secondary actions of the poison, this practice must be as unwarranted as hopeless.

Of the Poison of Cellulitis Venenata.

Cellulitis Venenata is that disease which occasionally affects the anatomist from punctures received in dissection, and also butchers, farriers, and cooks, in the prosecution of their business, in consequence of the dead animals with which they are conversant sometimes being in a morbid or poisonous state. This poison, however generated, being absorbed, produces inflammation, not only of the cellular tissue of the punctured limb, but often also of some remote part, as of the opposite side or arm. Dr. Collis was perhaps the first to draw the attention of the profession to this interesting subject, by the relation of two fatal cases, in the third volume of the Dublin Hospital Reports. This example has been followed by Dr. Duncan, jun., by Mr. Travers, and by Mr. Stafford. The facts thus obtained are not numerous, but are sufficient to enable us to give a slight sketch of the probable laws of this poison.

Remote Cause.—The remote cause is the deceased human body, or the dead body of some animal—the persons attacked, and the phenomena of the disease, plainly demonstrating such bodies, in a given number of cases, to be poisonous. It is admitted, for instance, that medical men and medical students are liable to this disease in a much larger proportion than other classes of persons; and also, that they are liable to it only while they are prosecuting their professional duties or studies. It is therefore fair to infer, that as they can cut or wound themselves with impunity at other times, that the instrument with which the puncture has been inflicted must be armed with some deleterious agent. It is not determined, however, whether this agent is always the same; also, whether it is the product of animal decomposition, or generated during the disease of which the patient has died.

There is one circumstance, however, which seems to demonstrate a given specific poison, and not a plurality of poisons, which is, that the same phenomena result, or nearly so, after the examination of bodies of patients who have died of the most opposite diseases. In Professor Dease's case, for example, the patient had died from pulmonary consumption; in Mr. Higginbottom's, of typhus. The patient examined by Mr. Blythe and Mr. Young had died of hydrothorax; while Dr. Dease and Mr. Newby were infected by opening the bodies of patients who had died of enteritis. Mr. Burton died from examining an aneurismal sac; and Dr. Kelly, Dr. Andrews, and Mr. C. Cheyne, of Leith, were all infected, in various degrees, after having been engaged in the examination of a patient on whom the Cæsarian operation had been performed.

It is usually considered that animal matter, far advanced in a state of putridity, is the cause of this disease; but experience has shown that an advanced state of putrefaction is a protection to the anatomist, and that the greatest danger is to be feared from a recently dead body; as proof of this law, the disease was contracted by Mr. Archer, a dresser of Guy's Hospital, in consequence of his examining the body of a patient who had died only the day before, and that in the depth of winter, or on the 11th of February. Mr. Dean was infected by the body of a woman who had died only forty-eight hours before, and also in February. The patient examined by Dr. Pitt had been dead about the same time, and the examination was made at Christmas. Mr. Delph and Mr. Smart were infected May 11th, by the body of a woman who had died the same morning, and was still warm; and Mrs. Hodges was infected in consequence of hanging up a piece of fresh meat. It is plain, from these instances, that the time which had elapsed from the death of the patient till the examination of the body was too short, and the temperature of the time of year too cold, to allow of rapid putrefaction.

The intimate nature of this poison is entirely unknown, and it has been stated it is questionable whether it be formed in the last moments of life, or is a product of incipient decomposition. It would appear that some bodies are more apt to generate it than others, a given body often infecting two or more persons, who have been in the habit of making posthumous examinations for years with impunity. Thus one body communicated the disease to Professor Dease and Mr. Egan; another to Mr. Hervey and Dr. Hennen, jun., and in a slight degree also to Dr. Dumbreck; another to Mr. Young and Mr. Blythe; and another to Mr. Cumming and Mr. Blythe, all persons continually practised in dissection.

Some parts of the body also appear to communicate this dangerous disease more rapidly than others. The brain of the recently dead body is supposed to be extremely apt to produce it. The sero-purulent fluid also found in the larger cavities is also greatly infectious. But the most dangerous animal fluid is that contained in the abdomen after puerperal peritonitis; and also the serum found in diffuse or gangrenous inflammation. The white cancer of the liver and the substance of other medullary tumors is said to be greatly irritating. The dead bodies of animals are much less infectious than those of the human subject; nevertheless, persons who clean tripe, and horse-knackers, are said to be subject to inflammation of the hands.

It is probable that in all cases a puncture or abrasion is necessary to the absorption of this poison; but sometimes the wound is so trifling that the party infected is not aware of it, nor is any trace of it distinguishable at the time the disease is set up.

Predisposing Causes.—The infected person has frequently been in a state of impaired health at the time of receiving the injury, or else in a state of health, however inexplicable, which predisposes him to the action of the poison, for hundreds of punctures are inflicted with impunity for one that endangers life; and it has often happened that two persons out of three examining the same dead body have escaped, although they have received similar punctures with the suffering party. In general, indeed, the punctures, although the lancet be poisoned, are not followed by any serious accident in the strong and robust, the punctured part only slightly inflaming, festering, or becoming the seat of a small phlegmonous abscess. When the student, however, is of a feeble constitution—weakened by hard study, excess, or previous disease,—his liability is greatly increased, and the disease may assume a fearful character. The spring is supposed to be the season at which the greatest numbers are attacked.

Contagious.—No case is known of the transmission of this disease from one living person to another.

Susceptibility exhausted.—Some persons repeatedly suffer from wounds received in dissection. It is probable, therefore, the susceptibility to this poison is never exhausted.

Co-exists.—There is no given state of the body known to give exemption to the action of this poison.

Modes of Absorption.—After the examples that have been given, no question can exist about the cutaneous tissue absorbing this poison. Gaspard and Majendie have also shown that putrid matters, whether injected into the cellular tissue of the groin of an animal, or into its veins, equally produce the death of the animal subjected to the experiment. This poison, therefore, probably infects the blood.

Period of Latency.—The period of latency of this poison is unusually short. Thus, Mr. Elcock punctured his finger on opening a patient at twelve o'clock, and it became so painful that he showed it to Sir Astley Cooper the same evening. Dr. Pitt examined his patient at eight o'clock in the morning, and in the evening of the same day he complained of uneasiness in the punctured part. In Mr. Percival's, and also Professor Dease's case, the local symptoms were only delayed till the following morning. A longer instance of latency occurred in Mr. Newby; this gentleman opened the body of a child that had died of enteritis on Sunday, but it was not till Wednesday evening that he was laid under the full influence of this fatal poison, which in a few days destroyed him. The longest period of latency is that recorded by Dr. Spurgin, of a cook-maid, who had been practising on a stale hare, to learn the method of boning it; and a few days elapsed in this case when two slight scratches, which she remembered to have received at the time, began to inflame, and a long and severe disease followed.

Pathology.—The theory of this disease is, that a poison is absorbed and infects the blood, and after a short period of latency usually occasions only inflammation of the wounded part. In other cases, however, in addition to the local inflammation, a severe form of fever is added, with extreme prostration and coated tongue, and as the disease proceeds, abscesses are often formed in various parts of the body, sometimes remote from the original wound. The poison, therefore, acts locally on the punctured limb, on the cellular tissue generally, and also on the great nervous centres, producing the phenomena of fever.

After the death of the patient, in such few instances as have been examined, the cellular tissue has been found variously inflamed, the parts affected being loaded with serum in one part, with pus in another, and in a third gangrened, while the abscesses usually contain much sphacelated cellular tissue. The muscular fibre beneath the affected part has been found softened and more readily torn than usual; and in one case quoted by Dr. Duncan, both layers of the intercostal muscles were destroyed, and the ribs denuded. In some instances the muscular fibres are paler than usual, and in others darker. These phenomena have been found in whatever part the abscess may have been situated.

The axillary glands are usually enlarged and imbedded in a highly diseased cellular structure; "but although a swollen and tender state of the axillary region is one of the first symptoms observed, I have never found," says Dr. Duncan, "the glands so much diseased as to support the idea that they were the primary cause of the surrounding inflammation." The pathological states of the brain are not yet satisfactorily determined.

Symptoms.—Cellulitis venenata has many grades, so that it may be divided into cellulitis venenata mitior, and cellulitis venenata gravior.

In the milder forms of the disease, the wound, usually on the back or palm of the hand, or on the fingers, inflames, an ill-defined but general swelling of the finger or the whole hand follows, and this sometimes extends up the arm as high as the elbow, accompanied with a throbbing pain, and an inflamed state of the lymphatics. In severe cases the inflammation extends still higher, or to the axillary glands, so that the whole limb is more or less affected. This inflammation is commonly seated in the cellular membrane, external to the fascia, and also in the sub-fascial cellular tissue. In slight and ordinary cases it terminates in effusion of serum, which being absorbed, the disease subsides; the patient suffering, perhaps, for a few hours from a slight attack of secondary fever.

In severe forms of the disease, the inflammation spreads from the arm or axilla to the trunk of the body, as in Dr. Pitt's case, without leaving any sound interspace. The most alarming variety, however, is when the local injury heals, or only a slight inflammation, as a vesicle or pustule, forms at the point of puncture, the severe inflammation attacking some remote part, as above the elbow, or the axilla of the same side, whence the inflammation extends over the neck, perhaps down the sternum to the ilium, or even to the middle of the thigh, as in Professor Dease's case. In most cases these extensive inflammations have been limited to the same side by the mesial line, and only in a few instances has it passed that boundary. In other instances, as in Mr. Dease's case, the disease commenced in the left axilla, and passed to the right fore arm; and in Mr. Cumming's case it began in the left axilla, and passed to the right, where it terminated in gangrene.

The abscess which forms in the more dangerous cases is always diffuse, has no tendency to point, and is only slightly elevated above the surrounding parts, while its limits are rarely defined by a margin. Its elasticity is something between emphysema and œdema, and has been termed boggy or quaggy. If the glands likewise should be enlarged, it is only slight in degree, while no lymphatic vessel can be traced to them.

In these bad cases the inflammation runs its course, and terminates in extensive suppuration, without any redness of the skin, and perhaps in all cases the cutaneous inflammation is secondary, and consequent on the inflammation of the cellular tissue.

The pain in the swollen part is generally exquisite. In Mr. Hutcheson's case it was his chief complaint, even while there was yet neither discoloration or phlegmon. In Mr. Dease's case the pain also preceded the redness, and was almost intolerable. Dr. Pitt suffered so much as to have observed, he had never before known what pain was; and in Mr. Clifton's case it amounted to torture.

Such are the local symptoms. In a few cases the local disease is preceded a few hours by primary fever; but in the majority of cases the local disease is first set up, and the fever, consequently, is secondary; but in these latter cases the fever has often run high, and endangered the life of the patient before the local inflammation has been clearly developed. In every case the fever is typhoid in character, with great prostration of strength and profound depression of spirits. In general, however, the mind is collected and the delirium inconsiderable, or occurs only at night, or towards the close of existence. Still, there are a few cases in which it commences early, is violent, and continues throughout the disease. In several instances the skin, so far from being hotter than usual, has been sensibly colder; while the perspiration has been sometimes so fœtid as to be hardly bearable.

Diagnosis.—This disease is distinguished from typhus by the local affection, and from erysipelas, by the history of the case, and the existence of the intense pain.

Prognosis.—The great majority of these cases are slight, and are hardly a source of anxiety. In the severer forms of the disease, as a general rule, all recover when the inflammation is limited to the lower arm, and does not terminate in gangrene. A slight inflammation, also, of the absorbents and their glands is also often recovered from. On the contrary, few survive when the axilla is the principal seat of the disease, without any obvious connexion with the punctured part.

Treatment.—When cellulitis venenata has been of such severity as to merit a record of the case, it would appear, all theory apart, that whatever has been the mode of treatment, one-half have recovered and one-half the patients, or nearly so, have died. In the cases recorded by Dr. Duncan, jun., of Mr. Blythe and of Mr. Young, each treated as nearly similar as possible, the one died and the other recovered. Of eight cases that were bled or leeched, or underwent both operations, four died, and among them Mr. Cumming, who was bled four times from the arm, and had four dozen leeches applied. In the cases reported by Mr. Travers, Professor Dease was bled to twenty ounces, and had 100 leeches applied to the shoulder, and yet he died; while Mr. Clifton, who was bled to a still greater amount, recovered. Eight other cases are recorded that were treated by antiphlogistic medicines, by leeches, and by poultices, and of these four died and four recovered. Of two treated by tonics, one died and one recovered; while in Dr. Pitt's case the treatment was complex, and he died. It should also be added, that in almost every case calomel was used in greater or less quantity, and evidently with a most unsatisfactory result. It is plain that we at present possess no specific treatment against this poison, and the treatment will probably for a long time continue to be directed to merely relieving the symptoms; and that bleeding, opiates, and stimulants, with attention to the bowels, will long divide practitioners as to their respective merits. In the last stages of the affection, however, all perhaps will agree in the necessity of supporting the patient with wine, quina, &c.

With respect to local treatment, it may be laid down as a general principle, that, severe disease once established, a termination of the inflammation by resolution is out of the question, and that the best chance of recovering the patient is to adopt such measures as may lead to a healthy suppuration. Most authorities are agreed that leeches to the affected limb afford relief, and that their application is to be recommended, though not to such an extent as greatly to lower the patient; and in addition to leeches, that poultices should be applied to the inflamed part. Sometimes the pressure of the poultices is intolerable, and in these cases a local steam bath occasionally affords much relief. In addition to these warm applications, Dr. Lendrick recommends oil of turpentine and tinct. opii; while Dr. Osborn recommends pledgets, sprinkled with tinct. cantharidis, to be applied to the parts, and covered with the poultices. In some cases warm applications, instead of bringing relief, increase the sufferings of the patient, and then evaporating, or other cold lotions around the limb, should be substituted. When pus has formed, the propriety of making an opening is obvious.

It not unfrequently happens, however, that without any sufficient evidence existing of pus having formed, the patient is suffering most distressing pain from the great tension of the part affected, and this accompanied by a fluttering pulse, delirium, and great prostration. Under such circumstances, ought the swelling to be incised? Dr. Lendrick is of opinion, "If there be proof that the patient's sufferings are attributable to the parts being girt down by a tense fascia, there can be no doubt of the propriety of affording relief by an incision. But in the majority of cases," he adds, "the excessive pain is not referable to such a cause, and speculative incisions only increase the patient's torture; for I have been informed by patients that their sufferings, both general and local, have been increased by it."

Dietetic and Preventative Treatment.—In the early stages the diet of the patient should be slops and the usual antiphlogistic diet adopted in fever. In the latter stages, and after pus is formed, wine, porter, and animal food are essential to the recovery of the patient.

As a preventative remedy, Dr. Macartney recommends the punctured part to be washed with a saturated solution of equal parts of alum and nitre. The most certain preventative, however, is the application of lunar caustic to the part immediately on the injury; but it should be remembered, the caustic will be of no avail after a few seconds, or a very few minutes.

Of the Poison of Porrigo.

Porrigo is a generic term for an eruption of psydracious pustules, usually termed *scald-head*. This disease is contagious, and has its especial seat in the scalp, but may extend over other parts of the body.

Remote Cause.—The origin of the poison, and the time of its first appearing, is entirely unknown.

Predisposing Causes.—The effects of *age* are very marked in the production of this disease, for porrigo is seldom seen except in childhood and in early adult age. The porrigo favosa and porrigo scutulata have been met with as early as the second or third day after birth, when the mother has been labouring under one or the other of those diseases; but the most common period is the seventh or eighth year. Every form of the disease is much less frequent after puberty, and, with some rare exceptions, is unknown in persons that are bald or advanced in life. Girls, from wearing their hair long, are supposed to be oftener affected than boys, and the feeble and scrofulous child is something more exposed to this affection than the strong and the healthy. The children of the rich, also, from their greater cleanliness and less exposure to the contagion, suffer much less from porrigo than those of the poor and indigent.

Contagious. — Bateman, Rayer, Willan, Mahon, Biet, and almost all writers agree, that certain forms of porrigo are contagious, although they differ as to the number of species possessing that property. Porrigo, however, is not eminently contagious, for although it often runs through schools, and is often traced from individual to individual, yet much difficulty has been found in communicating the disease by direct voluntary inoculation.

Fomites.—Bateman says, " This disease is principally propagated by contagion; that it is by the actual conveyance of the matter from the diseased to the healthy by the frequent contact of the heads of children, but more generally by the use of the same combs, caps, and hats;" " the multiplication of boarding-schools appearing to give increased prevalence to this disease," and the same testimony is given by Rayer, Willan, and most other writers, to the extension of this disease by similar fomites.

Pathology.—The theory of this disease is, that the poison is absorbed and infects the blood, and after a given period of latency produces a pustular eruption of a given character on the part of the scalp to which it has been applied, and subsequently perhaps of the whole scalp. A similar eruption sometimes appears on other parts of the body. The proof of the blood being infected in this disease is, that there have been cases in which the head has been shaved and carefully watched for many months, and each favus destroyed by lunar caustic as soon as it has appeared, yet the whole scalp has ultimately been covered with them, and, as far as could be judged, without any direct application of the poison.

Pathologists are not agreed as to the number of species of porrigo. Sauvages enumerates nine species; Willan six species; and Rayer only two species. It will perhaps be nearer the truth to limit them to four, or to the porrigo favosa, the porrigo lupinosa, the porrigo furfurans, and the porrigo scutulata. These species are distinguished by the different magnitudes of the pustules, the larger being termed favi, the smaller ones achores; also by some difference in the forms of their crusts or scabs. The frequency with which these different forms occur is not determined, but Alibert says, of the cases he treated in the Hôpital St. Louis, 90 per cent. were porrigo favosa.

The porrigo favosa, or *honey-combed* scald-head, is an eruption of the larger pustules or favi. The more recent writers have described four stages of the complaint, or a stage of vari, of pustule, of incrustation, and of ulceration.

The disease commences with a slight pruritus or itching of a few hours' duration, followed by an eruption of small red vari, sensible to the touch and to the sight. These augment in size, and before 12 hours have passed, a yellowish point forms on each of their apices, at first so small as to be only visible under a glass of considerable power, but which gradually increases, so that at the end of 24 hours it is as big as a millet seed, and this keeps gradually enlarging, till at the end of five or six days, it is of the size of a lentil. In some cases, however, they are 15 to 20 days attaining this magnitude. This pustule never acquires much elevation above the surface of the skin, and its form, according to some authors, is well-defined and regular, while others state it to be irregular and slightly umbilicated, or depressed in the centre. The peculiar matter which fills the pustule scarcely remains fluid for 12 hours after its formation, but concretes into a dry, brittle, candied, honeycombed looking scab or crust, which retains the form of the pustule, is similarly cupped or depressed in the centre, covered by the epidermis, while its under surface is marked by a small mammary process, which corresponds to the depression of the pustule. The honeycombed appearance of the scab gives the peculiar character of the disease, and hence the term "favus." The crust continues to increase, still preserving its circular form and depressed centre, till it occasionally attains a magnitude of five to six lines in diameter. When the crust is recent, it is of a yellow or fawn colour; as it becomes older its hue becomes lighter, and, as it is easily reduced to a powder, has been compared to pulverized sulphur.

The number of favi is considerable, and they commonly appear in crops, affecting the same or different parts of the head at distant intervals. They may be either distinct or confluent. When very numerous they are confluent, but the cupped form of the individual crusts may still frequently be recognized; and, according to Rayer, should this peculiar form be lost through the copiousness of the secretion, still, by removing the superficial layers, each particular favus, with its central depression, may in general be made out. At a more advanced stage of the disease the epidermis disappears, and a viscid fluid is secreted in such abundance as to form one entire incrustation over the whole head; hence porrigo larvalis, or mask or vizor-like scald-head. The smell of the scab is peculiar, and has been compared to that of the urine of a cat, or of a cage in which mice have been kept.

When a crust of recent formation is removed, a circular depression, wider and deeper than the favus, is seen. At a more advanced stage the ulceration penetrates below the dermoid tissue. Indeed Alibert says, he has never been able to remove a crust for the purpose of making a preparation without deeply wounding the scalp, and producing considerable hæmorrhage, while in some cases a deep and extensive ulceration takes place, which has penetrated even to the bones of the cranium.

In this form of the disease the hair of the part is most commonly diseased and stands awry, and, if extracted, is found looser than natural. According to Dr. Willis, the root in the first stage is covered with a layer of white matter like coagulated albumen, and a day or two after a puriform fluid surrounds the shaft. In some cases the hair-bulb is partially destroyed, and baldness of those parts ensues; but in general, when the disease terminates, the hair, though weak at first, is entirely restored, and its colour unimpaired.

In most persons the favi occupy only the scalp; but in a few instances they form on the forehead, temples, shoulder, or fore arm. Alibert has seen them on the loins, the sacrum, the knees, and on the upper third of the leg; and Bateman has seen them on the feet and toes. It is singular, however, says Mahon, they are never found on the pubes or axillæ, a fact strongly militating against the hypothesis of the hair-bulb being the seat of the disorder. The most remarkable fact, however, is, that the nails, both of the toes and feet, have been known to be affected, being elongated and thickened; the regularity and polish of their surface giving place to longitudinal rugosities, and ultimately dividing into branches at their extremities, resembling, as has been fancifully observed, the statue of Daphne changing into a laurel. The diseased nails are not shed, but acquire an unusual sensibility; their colour is yellow, like the favus, and when cut they discharge a similar viscid fluid. This disease is said never to be cured, the nail preserving the modification which disease has imposed on it.

When porrigo forms on other parts than the head, the anatomical structure of the cutis being different, there is a remarkable difference in the severity of the disease; for the scab is very superficial, and the skin appears rather abraded than ulcerated, while the inflammation is rather diffuse than pustular.

The *Porrigo lupinosa* is an accidental variety, in which the scab resembles a lupine rather than the cell of the honeycomb, and is very rarely seen.

The *Porrigo scutulata*, so named from a shield-like appearance of the scab, like the porrigo favosa, has four stages; the first being such inflammation as causes the hair to fall off; the second is the formation of the pustule; the third is the process of incrustation; and the last is that of ulceration. The disease, however, may terminate in the first or any succeeding stage, without running through the whole number. In the first stage, the hair falls off, and the patch thus made is very generally circular or oval, its margin well-defined, and covered with scurf. When of some extent and well marked, the patch is soft, doughy, and painful when pressed upon. Some of the hair appears to be removed by the roots, while other portions are broken off near the scalp, the roots remaining. Those which remain are readily removed by friction, and if pulled have scarcely any hold of the scalp.

After an uncertain time the second stage commences by an eruption of the smaller pustules or achores. These are small yellow points, not prominent, generally traversed by a hair, much more numerous at the circumference than at the centre of the patch, and are soon succeeded by scabs, imagined to have some resemblance to a shield, which unite in such a manner as to form incrustations of the breadth of the eruption. If the pustules be left to themselves, not only do the areas of the primary clusters extend, but their edges blend together, forming extensive and irregular patches. If the progress of the disease be unimpeded, the patches may so extend, that at length there remains only a narrow border of the hair uninjured round the head. When the scabs are removed, the surface of the patch is red and shining, studded with slightly elevated points or papulæ, in some of which minute globules of pus may occasionally be seen. In some few cases extensive ulceration of the scalp takes place.

The *Porrigo furfurans*, or scurf-like scald head, is the last form of this disease, and commences with an eruption of small achores. The discharge from the pustules is trifling in quantity, and the excoriation slight. The humour, therefore, soon concretes and separates into thin lamellated scabs or scurf-like exfoliations. At irregular periods the pustules re-appear and discharge, but soon dry up and exfoliate. This form is attended with a good deal of itching and some soreness of the scalp, to which the disease is confined; the hair also either falls off, or else becomes thin, less strong in its texture, and lighter in colour. Occasionally the glands of the neck are swollen and painful.

Symptoms.—The symptoms are entirely local, the constitution being seldom in any degree affected.

Diagnosis.—A practised eye will readily distinguish these diseases from lepra, or other eruptions to which the scalp is liable.

Treatment.—The treatment of the forms of porrigo is not very strictly determined. Thus, in attempting the cure of porrigo favosa, some practitioners rely entirely on a constitutional treatment, as on small doses of rhubarb and soda, small doses of mercury, some preparation of iron, or else on vegetable tonics, as the inf. cascarillæ or compound infusion of gentian. Others, again, as entirely rely on a local treatment, attempting to exterminate the disease by cauterization, or else by applying some favourite ointment; and the catalogue of ointments used for this purpose includes all that have at any time been admitted into the pharmacopœia.

The best method, however, of treating porrigo favosa is to shave the head, and apply a poultice till all the scabs, or nearly so, are removed, and this being effected, the whole scalp should be anointed with the tar ointment (unguentum picis liquidæ). This ointment should be washed off night and morning with soft soap and water, and be as often re-applied. The head also should be shaved twice or thrice a week, and where there are other children, the affected child should wear an oil-skin cap to prevent the disease from spreading. This form of porrigo in the early stages will sometimes yield by washing the part with the oleum terebinthinæ night and morning, and cutting the hair close.

The *porrigo scutulata* is a disease often rebellious to every mode of treatment, but applied at a favourable moment every method succeeds. Dr. Willis has seen the disease yield to fomentations, or to bread poultices; while applying the lunar caustic round the patches about a line from their outer margin, is another favourite method. In the latter periods of the disease, Dr. Willis recommends "a solution of sulphate of copper, gr. vij. to x. to the ounce of water; of the nitrate of silver in the same proportions: the mild ointment of the nitrate of mercury, a salve of the black sulphuret of the same metal (sulphuretum hydrargyri nigr. ʒ j. ad ʒ ij. adipis ℥ j.); the unguentum picis, an unguent of the cocculus Indicus pulveriz. ʒ j. to ʒ ij. adipis ℥ j., may be tried one after the other; and in different instances each will have the merit of the cure." "The most effectual remedy in itself is unquestionably the eradication of the affected hairs. These are to be removed singly with the forceps, not pulled out along with all the healthy growth in their neighbourhood, as used formerly to be done by the barbarous application of the pitch-cap."

This disease occurring on surfaces not particularly covered with hair yields at once to the application of a solution of sulphate of copper, or of the nitrate of silver in water.

Of the Paludal Poison.

The marsh generates a poison which produces intermittent, remittent, and yellow fevers, and also dysentery. It will be more convenient, however, to treat first of the paludal fevers, and then of dysentery. This class of disease, so interesting to the medical philosopher, and formerly so destructive, has almost disappeared from this country, owing to the improved drainage both of the towns and of the agricultural districts, for only 95 cases are reported to have died of ague in England and Wales in 1839.

Remote Cause. — The facts collected by medical writers from Hippocrates downwards, show that every country is unhealthy in proportion to the quantity of marsh, or of undrained alluvial soil that it contains; the inhabitants of such districts dying often in the ratio of 1 in 20, instead of 1 in 38, the average mortality in healthy countries, and also that the diseases from which death results in these districts are peculiar fevers of an intermittent or remittent type, varying in severity according to the temperature or latitude of the place, and also dysentery. The connexion of a given class of disease with marshy districts is thus distinctly established, and the inference of necessity drawn is, that it depends on a peculiar cause, or a paludal poison generated by the marsh, and we have an endless series of instances to establish the truth of this deduction.

Ancient Rome was once the seat of so many fatal epidemics, that the Romans erected a temple to the goddess Febris. These arose from the great masses of water poured down from the Palatine, Aventine, and Tarpæian hills becoming stagnant in the plains below, and converting them into swamps and marshes. The elder Tarquin ordered them to be drained, and led their waters by means of sewers to the Tiber. These subterraneous conduits ramified in every direction under the city, and were of such considerable height and breadth, that Pliny terms them "operum omnium dictu maximum suffossis montibus atque urbe pensili subterque navigata;" and this system of drainage, which was continued as late as the Cæsars, rendered Rome proportionably healthy, and the seat of a larger population than has since perhaps been collected within the walls of any city. On the invasion of the Goths, however, the public buildings were destroyed, the embankments of the Tiber broken down, the aqueducts laid in ruins, the sewers obstructed and filled up, and the whole country being now again overflowed, Rome once more became the seat of an almost annual paludal fever, as in the times of her earliest foundation.

The insalubrity of the Pontine marshes, past or present, is notorious. Three hundred years, however, before the Christian æra, Appius Claudius drained them by making canals, building bridges, and by constructing that magnificent road, portions of which still remain, and still bear his name. This road, the "regina viarum," was the especial care of the Gracchi, of Julius Cæsar, of Augustus, of Trajan, of Vespasian, and of the Roman Emperors generally; and was that on which Horace delighted to travel on account of the number and excellence of its inns, for "minus est gravis Appia tardis." On the invasion, however, of Italy by Theodoric, Cæcilius Decius gave a free course to the waters in the neighbourhood of Rome, and the re-establishment of these immense marshes was one of the many disasters which resulted from the attacks of the Goths on Italy. Their present state is such, that the Tuscan portion of the Maremme, and indeed the whole of that district, may be said in summer to be absolutely depopulated, not a single house retaining an inhabitant, except the guard-houses, with a few soldiers and custom-house officers, and these are relieved twice or thrice during the summer with the Maremme fever almost invariably upon them.

Of modern towns that have been drained and remained healthy there are many examples. London, for example, in the time of Sydenham, was infested with epidemic intermittent fever and dysentery, the mortality from the former alone averaging, in a comparatively small population, from one to two thousand persons annually. In the present day, owing to the formation of sewers and a general system of drainage, a case of ague contracted in London is hardly known. Many other towns, both of this country and of France, as Portsmouth, Rochefort, and Bordeaux, from being the constant seat of paludal fevers, have been from the same causes rendered in like manner perfectly healthy.

The intimate connexion, therefore, between marshy districts and certain diseases is thus established by a great amount of direct or indirect evidence; the next proposition is, what is the nature of the noxious agent, and what circumstances are necessary to its formation or extrication?

It seems certain that the deleterious agent is neither heat nor moisture, nor any gas extricated from the marsh. It cannot be heat, for many of the hottest parts of the West Indies, as the sandy quais, are free from fever. It cannot be moisture, for no persons enjoy better health than the crews of a clean ship at sea, even when cruizing in tropical climates, as long as they have no communication with the land. While carbonic acid, azote, oxygen, or carburetted hydrogen, the gases collected by stirring the bottom of marshes, have all been inspired without producing any disease similar to paludal fever, and it seems consequently to follow almost as a necessary consequence, that the remote cause must be a miasm, poison, or malaria, whose presence is solely detected by its action on the human body, and two hypotheses have been imagined to account for its origin; the one, that it is a product of vegetable decomposition; the other, that it is an exhalation from the earth, favoured by the conditions of the marsh.

The general evidence in favour of vegetable decomposition being the remote cause is, that all countries are for the most part free from paludal diseases while the crops are growing, and only become unhealthy after the harvest, when large quantities of vegetable matters are left on the ground at the time the rain begins to fall. It may be said that, except rice, we neither reap nor sow in marshes. This is unquestionably true; but it will be seen hereafter that marshes are in general healthy till the summer's sun, or other cause, has diminished their waters, and bared a greater or less portion of their bed. The part thus exposed almost always contains a large portion of vegetable matters, which, rnnning into rapid decomposition, generate the poison which gives origin to this class of disease.

The particular evidence of vegetable decomposition being the source of this poison is as follows:—Lancisi, for example, gives the history of an epidemic remittent, or intermittent, which for several summers infested, and almost depopulated, the ancient town of Urbs Vetus, situated on an elevated and salubrious part of Etruria, and which was traced to the circumstance of the peasants steeping their flax in some stagnant water in the neighbourhood of the town. This practice was therefore prohibited in 1705, and the epidemic ceased to appear. The apprehension of the steeping of flax being productive of paludal fever is not limited to Italy, for the ancient as well as the new "coutumes" of almost all the provinces of France have proscribed the steeping of flax, "la rouissage," even in running waters, from the fear of infection, and this prohibition forms part of the "droit public" of that kingdom. In the Netherlands also the same belief prevails, or has prevailed; for, in July, 1627, the King of Spain passed an ordinance, prohibiting the steeping of flax in the streams and canals of Flanders.

The experience of the indigo-planter is to the same effect. In India, after the colouring matter has been extracted from the indigo plant, it was formerly the custom to throw the detritus into large heaps or masses in the immediate neighbourhood of the works, and which, at the end of three or four years, becomes manure of an excellent quality. It was found, however, that these heaps, wetted from time to time by the heavy rains, and afterwards heated by the rays of a burning sun, rapidly decomposed, and at length emitted miasmata, which produced all the effects of those extricated from the marsh; for the workmen who lived near, and more especially those to leeward of these masses, were found to be very commonly attacked by fever, chiefly of the remittent type, and similar to those which prevail in the paludal districts of that country. This consequence is now so well established that the most intelligent indigo-planters no longer allow these heaps to be formed either near the works or in the immediate neighbourhood of the cottages of their workmen.

Ships also afford additional evidence of the truth of the hypothesis of vegetable decomposition being the remote cause. The Priamus frigate underwent some repairs at Plymouth previous to a voyage to the West Indies, but the chips and shavings, instead of being removed, were allowed to remain and to mix with the bilge-water under the limber-boards. On the voyage the foul state of the hold was indicated by the most offensive smells, and at Antigua a fever broke out, which daily destroyed increasing numbers. The true cause was not yet suspected, and a voyage was undertaken with a view of mitigating the calamity, but without success. The ship at length returned to Antigua, and the state of the hold was examined, and of the effect produced by this proceeding Mr. Hartle, one of the medical officers present, gives the following account:—When the limber-boards were removed the effluvium surpassed everything he had before experienced; a boatswain looking into the hold, fainted, and afterwards passed through a formidable attack of fever. Every individual also present likewise suffered from fever, and Mr. Hartle himself suffered from a slight indisposition. Although the frigate had only been six months from England, four large mud-boats of filth were removed from her, and which lay nine inches thick in the hold. Even the negroes employed in removing this mass were obliged to go on deck occasionally, so insufferable was the stench, and three of them had the characteristic disease. The after magazine, immediately under the gun-room, was found in the worst state, and this accounted, in the opinion of Mr. Hartle, for every officer's servant and every servant of the gun-room mess having suffered. Several cases occurred after the removal of the crew, in consequence, as it was discovered, of the men having gone on board clandestinely. The ship having been cleansed and thoroughly purified, the general health of the crew was restored, and on their returning on board continued good.

These facts render it highly probable that the noxious agent must be a product of vegetable decomposition, changed from a fixed to an aëriform state, and evolved in the lower regions of the atmosphere. But it must be admitted that no eudiometry has yet been able to discover the immediate principle. The atmospheric air collected at the embouchure of the Valtelline, a country where it is impossible to sleep without being attacked with fever, gives, on analysis, the same constituent parts and proportions of gases as that collected at the summit of the Alps, or in the narrowest streets in London. Moscati has condensed the exhalations of the marsh as they arose, by means of glass globes filled with ice, but these experiments have not led to any discovery, nor have they in the least degree elucidated the subject.

If we consider the paludal poison to be a product of vegetable decomposition, it follows that heat and moisture, quantity of vegetable matter and nature of the soil, though not the essential agent, must have a sensible influence on its formation, must vary its intensity or quantity, and also must limit paludal diseases to particular localities, seasons, and latitudes. A certain temperature, for example, is evidently necessary to its extrication; for should the heat be excessive, the vegetable substance, rapidly parting with its juices, is dried up or charred even before decomposition commences. Thus, in all tropical countries, even the most pestilential, the hot season is the season of health, and during the dry period of the year most parts of the country are as pleasant and healthy as any part of the world. But no sooner do the rains fall and the parched crust of the earth become softened, than vegetable decomposition commences, and so actively that the ground emits a most offensive stench, and a general and violent sickness follows. On the other hand, in countries of a low temperature, as towards the polar regions, the decomposition of vegetable matter is so slow that even the marsh is healthy.

It is certain also that a given quantity of moisture is as necessary to vegetable decomposition as a given temperature, and that the extrication of the paludal poison will be most abundant from that soil which contains no more moisture than is necessary for that process; for an excess in quantity, by dividing and separating the particles, and by preventing the access of atmospheric air, will either retard or altogether put a stop to putrescency. This law is most important, as it explains the reason why in some countries frequent and heavy rains will render marsh fevers prevalent, by saturating the whole of the open country, while privation of rain will in others produce exactly the same effect in other instances, merely by diminishing the superfluous quantity of water. Thus in the West Indies an uncommonly rainy season seldom fails, in the perfectly dry and well-cleared island of Barbadoes, to induce for a time general sickness; while at Trinidad, whose central portions are described as a sea of swamp, and where it rains nine months in the year, an excess of moisture is a preservation from sickness; for should at any time rains fall only eight months in the year instead of nine, the swamps become dry and bared to the sun, and remittent fevers of the worst kind are sure to make their appearance; and the same result follows on the subsiding of the waters of rivers that have overflowed their banks, as those of the Nile, the Rhone, the Danube, the Tigris, or the Ganges.

It is evident from these data that the swamp, on its approach to dryness, is the harbinger of disease and death, while an excess of rain is a preservative power. On the contrary, on the rich and dry plains, and even on the hills of tropical countries, rain is the cause not only of vegetable decomposition but also of disease, while dryness is the preservation of health.

In estimating, however, the dryness of a country, its superficial appearance is often deceitful. In the years 1748 and 1794 the summers were dry, and our troops took up the encampments of Rosendral and Ousterhout in South Holland. The soil in both places is a level plain of sand with a perfectly dry surface, and where no other vegetation existed or could exist but a few stunted heath-plants; yet in both years fever became epidemic among the troops in each place. On digging for water the cause was discovered, for the soil was found to be percolated with water to within a few inches of the surface. It is probable, therefore, that this country was originally formed of vegetable and other detritus, brought down by the Rhine and the Waal, and afterwards covered with sand thrown up by the sea, and which, heated by the summer's sun, became the powerful cause of the extrication of marsh miasmata. From the exceeding malignity of the salt marshes, it has been supposed that a mixture of salt and fresh water rendered a marsh more pernicious than either of them alone, on account of its destroying certain animals and vegetables that can exist only in the one or the other medium. It has been found, however, that on coasts where these marshes have been kept up to one uniform level by means of flood-gates, that the surrounding country is healthy; it has therefore been inferred that the sickness produced was a consequence of the perpetual alteration of the level of the waters of the marsh, and not owing to the admixture of sea and spring water. It is probably owing to a great excess of temperature that rocky countries, as Gibraltar and the Ionian Islands, are so often and so severely attacked with fever.

It is on the summits of these rocks that springs arise. The slightest frost produces fissures, into which mould and vegetable matters insinuate themselves, while the bare rock becomes heated to an intense degree. Humboldt, on ascending the Orinoco, found the station at the great fall depopulated by fever, which the natives attributed to the bare rocks of the rapids. He determined the heat of these rocks to be 118·4°, while the thermometer of the air immediately around was only 78·8°. Again, the rock of Gibraltar is known to be percolated with water, so that we can hardly conceive a more pestilential focus of disease, when the chemical causes necessary to the formation of miasm are combined. The existence of paludal fever in dry and rocky districts, therefore, although it may appear extraordinary and unexpected, is not necessarily an exception to the general law of paludal diseases being generated by miasmata generated by vegetable decomposition.

These facts seem, therefore, unquestionably to prove that heat and moisture, though not the primary cause of paludal disease, are conditions essentially connected with the extrication of the noxious miasmata, and consequently are a strong additional argument in favour of the hypothesis of vegetable decomposition generating the remote cause which produces them. It is certain, however, even when the conditions of heat, moisture, and vegetable matter most abound, that the paludal diseases do not always assume their severest forms: thus Jamaica is more unhealthy than Demerara, Demerara than Barbadoes; and, taking the West Indies generally, that country is more unhealthy than that of the East Indies. There must be other circumstances, therefore, affecting the problem in question; and there seems reason to believe that differences of geological formation, by favouring or otherwise influencing vegetable putrefaction, may greatly affect the health of countries similarly situated.

It is perfectly well known that different soils radiate heat with very different degrees of intensity, and consequently are, under the same circumstances, of very different temperatures, have very different powers of attracting moisture, and possibly also they may have other and more direct chemical affinities for generating or attracting the paludal miasm. Nothing, for instance, is better determined in husbandry than that the carbonate of lime, mixed with the ordinary matters of a compost, greatly forwards the processes of putrefaction, so that the mass thus prepared is fit in a much shorter time for the purposes of manure. The causes which occasion this rapid decomposition have been investigated by Sir Humphrey Davy, and he has ascertained that lands situated in calcareous districts, like the West Indies, where the surface is a species of marl a few inches deep, lying above limestone earth, are extremely hot, and attract moisture largely. No springs, it is well known, arise on chalky hills, the water being unable to penetrate so impervious a soil; yet it is of common observation that the ponds on those hills are always full. The different powers of absorption of water by different soils is often beautifully seen in this country; for the sandstone and limestone hills of Derbyshire and of North Wales, for example, may be easily distinguished from each other at a considerable distance by their different tints of verdure; the grass on the sand-stone hills being usually brown and burnt up, while that on the lime-stone is flourishing and green. Now if the difference in the absorbing powers of different soils in this country is so striking when the atmosphere contains only 1-75th part of its weight of vapour, how much greater results must arise from this difference of soil between the tropics, where the atmosphere contains three times that quantity, or 1-21st part of its own weight of vapour. It appears, therefore, there are some soils peculiarly favourable to the decomposition of vegetable matters, and consequently to the more abundant extrication of marsh miasmata; and it is remarkable that those countries most celebrated for paludal fevers have been found similar in their geological formation to each other, and to those artificial conditions which most favour rapid vegetable decomposition.

It seems probable also that the volcanic matters which enter so largely into the structure of the West India islands add to the intensity of the miasm, and thus cause the severest forms of paludal disease. It is perhaps to this cause that the severe paludal fevers which occasionally appear in the rocky and volcanic countries of Europe, as Gibraltar, the Campagna di Roma, many parts of Spain, and the Ionian Islands, are partly owing.

Of the matters evolved in volcanic eruptions, it seems probable that sulphur is the agent which, by its affinity, adds to the intensity of the miasm, for that substance appears to exist in a remarkable degree on the western coast of Africa, a spot fatal beyond all others to European settlers. An experience of between 30 and 40 years, for example, has shown that the copper sheathing of a ship will be as much or more injured in a nine months' cruize off that coast as from a similar service of three or four years in any other quarter. This circumstance induced the Lords of the Admiralty to send to Mr. Daniel, for analysis, a quantity of sea water drawn between the 15° and 16° of latitude of that coast; and that celebrated chemist has shown that it contains a considerable quantity of sulphuretted hydrogen, arising either from a soil having a volcanic origin, or else from the decomposition of the sulphates contained in sea water by the carbonaceous matters arising from the decomposition of the immense quantities of vegetable matters, which grow down even to the water's edge in that country. If sulphuretted hydrogen should hereafter be determined to be an element increasing the virulence of the disease, it will be an interesting question whether it acts merely as a depressant, or whether, by combining with the poison, it augments its intensity.

It is highly improbable we shall ever arrive at such an exact knowledge of the causes which affect the extrication of marsh miasmata as to enable us to predicate all the facts connected with paludal diseases; for the variations of atmospheric temperature, the changes in the quantity and nature of the electric fluid, the quantity of water, the nature of the soil, the amount and character of the vegetable matters, form a problem extremely complicated, and one whose smallest variation as to quantity or time may occasion marked differences in the result. As a general rule, however, it may be stated, that in no climate do paludal fevers prevail to an equal degree all the year round. In the winter much of the vegetable matter has already undergone decomposition, while the dryness of the season, and the diminished temperature, are little favourable to further putrefaction. When the spring, however, arrives, and the rain falls, and the heat of the sun increases, the earth again opens its bosom, and a miasm of mitigated intensity is again developed. In summer the products of vegetable decomposition are used up in affording nourishment to the growing crops, and this season, like the winter, is in general healthy. But in the autumn, and after the harvest has been gathered, when the ground is covered with vegetable debris, when the rain falls in torrents, and when the solar heat has acquired its greatest intensity, all the conditions of the greatest quantity of vegetable matter, of moisture, and of highest temperature are united; so that the season which realizes the hopes of the husbandman is also the period of pestilence and of his greatest danger. There are two other facts also which are too prominent to be mistaken: the one is, that the miasmata vary greatly in intensity in different countries, and also in different parts of the same country. Again, the diseases they produce, though annually *endemic* in given districts, yet become in certain years, and from the action of causes not yet determined, *epidemic*.

The proof that the miasmata vary greatly in intensity is, that paludal fevers vary in severity in different countries, and even in the same country, under different circumstances, assuming the different forms of intermittent, remittent, and yellow fever. In this country, when the summer is short and but moderately hot, the type of the marsh fevers is not usually of a dangerous character, and they are for the most part mild intermittents, only occasionally assuming a remittent form. In Holland and the Netherlands, and in the north of Germany, the intermittents are of a bad kind, and not unfrequently become remittent. In the still hotter climates of Spain and Italy, as well as in the more tropical regions, the intermittent is less common, while the remittent is frequent, violent, and not unusually assumes the form of yellow fever.

In the same countries also it is determined that difference of altitude is equivalent to difference of latitude; and, as a general law, it may be stated that in the Antilles, on the continent of America from Boston to Rio Janeiro,. and also on the continents of Asia and Africa, that while in the low country severe remittent or yellow fever prevails, still in the higher country, though immediately contiguous, the type is changed to intermittents and mild remittents. The interesting fact stated by Humboldt, that the vomito prieto never appears on the table lands of Mexico, is strictly in accordance with the observations made in every other equatorial part of the world at a similar elevation above the level of the sea.

The symptoms of intermittent, remittent, and yellow fever differing in many respects from each other, it may be doubted whether these diseases arise from the same cause, differing only in intensity. The circumstance, however, of intermittents passing into remittents, and remittents into yellow fever, and conversely of remitting and yellow fever often terminating in intermittent—facts observed not only in the East and West Indies, but on the continents of America and of Africa—demonstrate an unity of cause as firmly as the best established facts in medicine.

The law that paludal diseases, like many diseases produced by morbid poisons, are annually endemic, and only occasionally epidemic, is unquestionable. A few years ago intermittent fever was epidemic in particular districts in this country, but of late years the cases of ague have been comparatively rare. In Demerara it is observed that yellow fever is epidemic about every seventh year. At Gibraltar, although sporadic cases of paludal fever occur annually, still yellow fever is only occasionally epidemic, but so irregularly, that it assumed that character in 1804, then in 1810, again in 1813 and in 1814, and from that period the garrison suffered no similar visitation till 1828. The physical causes on which this greater virulence and greater spread of the disease depends are not determined. In temperate climates it has been observed that paludal fevers have been most epidemic when a hot summer has succeeded a wet spring. In the West Indies, however, they often appear without any warning, and without any sensible change in the quantity of rain, or in the height either of the barometer or thermometer. They follow no given cause, but, like influenza or cholera, appear to be altogether the result of inscrutable influences.

Having thus stated the general laws which relate to the extrication of marsh miasmata, it is now necessary to ascertain those limits within which the poison issuing from its source may infect the human body.

Infecting Distance.—As a general law the danger of infection is in proportion to the proximity of the party to the marsh; but there are many disturbing causes, which produce many remarkable exceptions to this law, and render the solution of the problem one of extreme difficulty, as the extent of surface which generates the miasmata, their intensity, the direction of the wind, its force, the season of the year, the time of the day, and the attracting influence of the surface over which they pass. These data are so multifarious that it is impossible to do more than assign the most general facts, both as to the altitudinal as well as to the lateral range.

The altitudinal Range.—The Monte Mario, which adjoins Rome, is, according to Breyslack, about 165 yards' perpendicular height, above the Pontine Marshes, and is extremely unhealthy. Tivoli, which is about 230 yards above the level of the same marshes, is infinitely more saluhrious; while at Serre, 340 yards' perpendicular height, the inhabitants enjoy an entire exemption from the paludal diseases which prevail below. In Italy it is estimated that an altitude of 1400 to 1600 feet is necessary to assure an exemption from paludal disease; but in the West Indies, where the poison is of so much greater intensity than in Italy, it is estimated that an elevation of 2000 to 2500 feet is necessary to give a similar immunity.

In towns partially freed from marsh miasmata by extensive drainage, the difference of a few feet perpendicular height makes an almost inconceivable difference in the liability of persons to paludal disease. The barracks of Spanish Town, the capital of Jamaica, for instance, consist of two stories, or of a ground floor and of a first floor; but it being found that two men were taken ill on the ground-floor for one on the first-floor, it was at length ordered that the ground floor should be no longer occupied. Dr. Cullen remarked a similar result at Portobello, Dr. Ferguson in St. Domingo, and Sir Gilbert Blane in the expedition to Walcheren. This law is so well understood in the West Indies, that in Demerara, and in many other parts, the houses are built on dwarf columns, after the manner of our corn stacks, in order that a stratum of air may be interposed between the house and the ground. In Rome, and in other towns of Italy, it is also so well known that the lower rooms of the houses are abandoned to the servants, the family occupying the upper rooms, as affording a greater protection from the paludal poison.

The *Lateral or Horizontal spread* of marsh miasmata is a problem still more difficult than that of the altitudinal range. The least complicated cases are those when water alone intervenes between the marsh and the recipient. In the year 1746–7, while our troops lay in Zealand, the sickness was so great among four battalions quartered there, that some of those corps had hardly 100 men fit for duty, or less than a seventh part of a battalion. In one corps, the Royals, only four men escaped. At the time, however, of this remarkable prevalence of fever on shore, Commodore Mitchell's squadron lay at anchor between South Beveland and the island of Walcheren, and the fever raged at both places; but nevertheless, in the midst of all the sickness that reigned around, the seamen were neither affected with fever nor flux, but continued to enjoy perfect health. These observations of Sir John Pringle were fully confirmed by those of Sir Gilbert Blane, during the last disastrous expedition to Walcheren: "I had," says this physician, "the opportunity of observing the extent to which this noxious exhalation extended, which was found to be less than was generally known. Not only the crews of the ships in the road of Flushing were entirely free from this epidemic, but also the guard-ship, which was stationed in the narrow channel between this island and Beveland. The width of this channel is about 6000 feet: yet, though some of the ships lay nearer to one shore than to the other, there was no instance of any of the men or officers being taken ill with the same disorder as that with which the troops on shore were affected." It appears, therefore, that in Europe the horizontal spread of marsh miasmata over fresh water is less than 3000 feet. With respect to the spread of the miasmata over salt water, Sir Gilbert Blane is also of opinion, that in tropical climates ships at a distance of 3000 feet from a swampy shore—a distance to which the miasmata did not extend in Zealand—and even further, were affected with the noxious exhalations. Dr. John Hunter considers a few miles to be a necessary interval for a ship lying to leeward of a swamp, in order to ensure a complete exemption from the disease. When, however, the swamp or other source of the poison is of small extent, a much less space is sufficient to assure an exemption. In the epidemic on the coast of Spain, the fisherman living with his family on board his boat has been rarely attacked, though lying at anchor close in shore. Also, during the late epidemics at Gibraltar, it was not unusual for the richer inhabitants to hire a Moorish vessel, and to live on board in the bay; and there was scarcely an instance of those persons having been affected, though keeping up a free communication during the day, either directly or indirectly, with the town. The explanation of the exemption of ships riding in rivers or shallow waters is, that the water in these situations is often much hotter than the land, or the atmospheric air, and consequently the vapour the latter contains is not condensed or deposited. In harbour, also, if the water be shallow, the same thing must take place; while in deeper water the temperature of the water is sometimes lower than that of the land, and consequently the poison is often precipitated, and at considerable distances from the swamp.

The extent to which marsh miasmata may spread from its source over land, in a horizontal direction, is a much more complicated question, on account of the different affinity which either the poison, or the vapour which it holds in solution, has for the many substances over which it passes; for different soils act as so many attracting or repelling causes, tending to limit or extend the spread of the poison. The effect of trees in intercepting the paludal poison is remarkable, and appears to have been known to the ancients, who are supposed to have surrounded their temples with groves on account of their protecting influence. Pope Benedict XIV. ordered a wood to be cut down which separated Villatri from the Pontine Marshes, and, in consequence, for many following years there raged throughout the whole country, and in places never before attacked, a most severe and fatal fever. The same effects were produced from a similar circumstance in the environs of Campo Santo. On the contrary, even in the West Indies, it is quite wonderful how near the marsh the planter, provided he is protected by trees, will venture to place his habitation. It is probable the immunity arises from the trees partly condensing the vapour of the marsh, and partly, perhaps, by their giving an upward direction to the current.

Different soils also act as attracting or repelling causes which affect the transmission of the paludal poison. The spot, for instance, on which the new National Dock and arsenal are built was a marsh of about 700 acres, and on either side of it are the villages of Greenhithe and of Northfleet. The peculiarity in this case is, that the inhabitants of these villages rarely suffered from intermittent fever, whilst those on the hills beyond were greatly afflicted with that disease. Dr. Maton mentions a similar fact in the neighbourhood of Weymouth, and the same circumstance is observed also in the neighbourhood of Little Hampton, and the marshy districts in Sussex.

The different force by which the paludal poison is attracted by different surfaces has often been observed in the West Indies. Fort Hildane at Porto Maria, Jamaica, occupies the extreme point of a promontory which projects considerably from the main land, and divides the bay into two basin-like recesses. This promontory, which is 150 feet above the level of the sea, and 200 feet across, is so nearly perpendicular, and so nearly alike in all its faces, that it has the appearance of an artificial structure raised for the defence of the harbour. It is formed of pure carbonate of lime, and looking at it merely as a dry mass of chalk, washed on three sides by the sea, we should imagine it to be one of the healthiest situations in the West Indies; yet, strange to say, the inhabitants at its base, and living on the banks of a sluggish river, covered with mangrove, are healthy, while the troops quartered on the rock were so rapidly destroyed by fever that for some years past it has not been garrisoned. In attempting to assign the law which may explain these varying and often apparently opposite phenomena, there is no hypothesis so satisfactory as that which supposes the diffusion of the paludal poison to follow the same laws as those which govern the vapour or dew, by which it is held either in a state of solution or suspension, and which, it is well known, is variously attracted and repelled by various soils, and the vegetable productions which cover them.

Predisposing Causes.—The paludal poison spares no *age;* for the infant at the breast, the adult, and the decrepit with age, are alike seen to shake with ague, or to suffer from some severe form of the disease. The adult, however, from his greater exposure to the cause, suffers the most. It has been supposed that our liability to the action of this poison decreases with increasing years; but the veteran soldier is found to suffer in a two-fold degree over the recruit. It is well known that the life of a woman is twice as good as that of a man, in the West Indies; but when the wives of the common soldiers have been equally exposed with their husbands, they have suffered in an equal proportion.

It appears that *race* greatly affects the liability to this class of disease. The white troops in the West Indies suffer a mortality of 36·9 per 1000, while the black troops only lose at the rate of 4·6 per 1000 from the same cause. It is certain that in every country the natives suffer much less than strangers; the sepoys, for instance, suffer as one in four and a-half, Europeans as one in three. Our invasions of Holland, Spain, of the Birman and Chinese empires, have been most disastrous to the troops; not, however, from losses in battle, so much as from the devastations of paludal disease, while the natives of those countries have not suffered in any unusual degree. The expedition of the French to Africa has also been attended with a similarly great fatality.

The different ranks of life have also a different liability; thus, the soldier is twice as liable to paludal fever as his officer. In every country, also, the poor suffer more than the rich; and again, the largest proportionate loss has occurred in the most densely populated districts. It has been supposed that habits of rigid temperance are not greatly protective from this disease. When, however, intemperance leads to exposure to the night air, it is most pernicious; and our armies, when on actual service, have on all occasions been more than decimated in a very few days from these conjoined causes. The most healthy period of the day is from three to six in the afternoon, after the greatest heat of the day is past, and before the dew falls. The most unhealthy is from sun-set to sun-rise. The most unhealthy season of the year is when the greatest degree of heat is combined with the greatest degree of moisture, or, in the northern hemisphere, between July and October. It is then we should take care that the sickening damp, the cold autumnal fog, "hang not relaxing on the springs of life."

Susceptibility not exhausted.—It has been supposed that a long residence in a paludal country destroys all susceptibility to the action of the paludal poison; but the returns published by the War Office and Army Medical Department painfully show a contrary result in the West Indies. Thus, while the annual mortality among the troops resident one year in Jamaica was 77 per 1000, mean strength; in those resident two years it was 87 per 1000; while of those still longer resident, it was no less than 93 per 1000.

It has also been imagined by many writers that persons who have suffered from one attack of paludal fever have an immunity from a second attack; Sir James Mac Grigor, however, states, "That in making calculations of efficient force, this description of men could not be relied on for operations long continued in the field," for "we found that in those who were convalescent or lately recovered from ague, the causes next prone to re-produce the disease were exposure to a shower of rain, or wetting the feet, full exposure to the direct rays of the sun, or to cold, with intemperance, irregularity, or great fatigue." There are many instances, also, of the same party being repeatedly attacked with the West Indian fever.

Co-exists.—This law has not been sufficiently studied; but small-pox and intermittent fever, scabies and intermittent fever, have often been seen conjoined, and there can be no doubt of the simultaneous existence of the paludal with many other morbid poisons.

Modes of Absorption.—It is apprehended the paludal miasmata are absorbed in all cases by the mucous membranes either of the lungs or alimentary canal; and being absorbed, that they mingle with the blood. Dr. Russell, at least, gives a case of a pregnant woman, labouring under ague, shaking at one hour while her fœtus shook at another, and that they were both cured by bark.

Period of Latency.—The period of time after exposure to the cause that the poison may lie latent, varies according to its intensity and the state of the recipient. In the West Indies men have been brought to the hospital ill of fever the night after landing; but the more usual period in tropical countries is three, four, or five days, to a fortnight. In more temperate climates the period of latency is usually much longer. The minimum of time may, perhaps, be as short as in the West Indies; but more commonly the poison lies latent for many weeks, and sometimes for many months. On the return of our troops from Walcheren great care was taken to quarter them in situations remote from all known sources of marsh miasmata; yet fresh cases continued to occur as late as five, six, eight, nine, and even ten months afterwards. It is probable, therefore, that cases of ague received into our hospitals in winter and early in the spring must have been contracted in the preceding summer or autumn.

Pathology.—The theory of this disease is, that the paludal poison is absorbed and infects the blood, and after a period of latency, more or less long, produces, according to the dose, functional disorders of the great nervous centres, terminating in the phenomena either of intermitting, remitting, or else that peculiar form of remittent termed yellow fever. These fevers may exist without any alteration of structure being set up, and the patient often dies from the severest forms, with hardly a trace of disease being discoverable. In the milder forms of these fevers, however, when the disease is prolonged, the poison acts upon and disorganizes a greater number of organs and tissues than almost any other poison, as the liver, spleen, lungs, heart, brain, and the serous and mucous membranes of the body generally. The specific actions, then, of the poison, within certain limits, may be said to be in the inverse ratio of intensity. The affections of the liver and spleen also vary greatly, according to the country; for in some parts of India the spleen is the organ chiefly affected, while in other districts it is the liver; the nature of the country, perhaps of the soil, impressing evidently some peculiar character on the poison.

The patients labouring under intermittent fever, or a minimum dose of the poison, in and about London, generally recover under medical treatment without any manifest derangement either of structure or of function of any organ or tissue. When, however, the disease is neglected, the poison may fall on the liver, and occasion merely disordered function of that organ, as jaundice; or it may produce inflammation, of which jaundice may or may not be a symptom; and this inflammation may be acute or chronic, diffuse or suppurative. If a liver, previously healthy, becomes the seat of diffuse inflammation, it is of the deepest hepatic tint, and loaded with blood; and we find it also often greatly hypertrophied, filling the abdominal and pelvic cavities, and according, perhaps, as the inflammation is acute or chronic, either greatly indurated or else so softened as to be easily broken down. In a few instances this inflammation may terminate in abscess, and generally of the usual phlegmonous character. On the contrary, if the liver be previously diseased, its colour, even when the seat of abscess, or otherwise most acutely inflamed, may be of the palest yellow, and its texture sometimes so soft and broken down that the blood-vessels may be dissected out with the fingers, or else so indurated as to form a muscular shapeless mass, of varying magnitude. When abscess forms it may rupture into the duodenum, or into the cavity of the abdomen, or it may point externally.

The paludal poison also often produces structural alteration of the spleen. In these cases that organ has been found sometimes so enlarged as to weigh 10 to 30 lbs., greatly exceeding the liver in size, while in other cases it is sometimes even less than natural. In consistency, also, it varies from a state of almost fluidity, a mere bag of blood, to a hardened mass, with a distinct indurated edge. It is also sometimes the seat of abscess.

When the poison falls on the peritoneum its functions may be alone deranged, so as to produce dropsy. Every form of peritoneal inflammation, however, may precede or accompany the ascites,—as the diffuse, the serous, the adhesive, or the purulent; and these forms may be either acute or chronic, but more commonly they are acute.

These are the most usual alterations of function and of structure in the mild paludal fevers seen in and about London in the present day; and in estimating the relative frequency of these secondary affections, ascites is the most common, then jaundice; while peritonitis, hepatitis, and splenitis are less frequent, and occur, perhaps, in nearly equal proportions.

The pathological phenomena which a medium dose of the poison produces, or that which gives rise to severe intermittent and mild remittent fever, are much more severe, and extend over a greater number of organs. Sir Gilbert Blane, in his observations on the Walcheren fever, remarks, that the structural derangements were more frequent, swelling of the liver and spleen then taking place in a very few weeks; which in England seldom occur, except under a long continuance of the disease, or after frequent relapses. The morbid anatomy, however, also extends to the mucous membrane of the stomach, which in a few instances was inflamed and ulcerated, and the ulcers had generally a sharp perpendicular edge, as if made with a punch. In such cases also as died dysenteric the large intestines, and more particularly the sigmoid flexure and the rectum, were always much contracted, thickened, inflamed, and ulcerated; the ulcers being often so numerous and so confluent that the whole inner surface of the gut appeared in a state of granulation.

The peritoneum was also very generally inflamed, especially that portion which covers the different organs, caused perhaps by extension of the morbid irritability of those parts, and from this circumstance the different viscera often adhered to each other and to the walls of the abdomen; and sometimes it also happened that an encysted abscess formed between the adherent surfaces. In other cases the intestines were often seen floating in serum or pus, or else were glued together. In dropsical and dysenteric cases the peritoneum was unusually thickened, while abscess occasionally formed in the folds of the mesentery.

The serous membranes of the chest were also frequently the seat of disease. Sometimes a dropsical effusion filled the cavity, in other cases the pleura pulmonalis was almost universally adherent to the pleura costalis, while in others the whole surface of the membrane was covered with recently effused coagulable lymph. In some cases the anasarca was general, but the more remarkable effusion of serum was around the epiglottis, when it formed a large tumor, sometimes as big as a turkey's egg, completely closing up the rima glottidis and suffocating the patient. The epiglottis also was in some cases found ulcerated and thickened. Bronchitis and laryngitis were not unfrequent, while the substance of the lung was sometimes the seat of severe inflammation, terminating either in the red or grey hepatization, or with effusion of serum.

The heart itself did not always escape the inroads of this destructive poison, for the pericardium was frequently found inflamed and covered with lymph, or else the seat of serous effusion. It was even seen ulcerated, and its adipose membrane œdematous.

The membranes of the brain were also often the seat of much inflammation, lymph or serum being often effused between them, while much water was occasionally found in the ventricles. The substance of the brain also, especially in dropsical cases, was so soft as hardly to bear the knife. Such are the destructive effects of a medium dose of paludal poison.

The maximum dose of the paludal poison producing the severer forms of remittent and of yellow fever does not occasion the same amount of disorganization. In this respect the paludal poison follows the great law of poisons generally, or, the dose being in excess, the patient falls before sufficient time has elapsed for the poison to set up its specific actions. "In cases of the Wynaad fever," says Mr. Walsh, "though black vomit and yellowness of the eyes were frequent, and they terminated fatally in four or five days, there was scarcely any vestige of local injury or of disorganization." Mr. Amiel also affirms, that the rapid progress and short duration of the Gibraltar fever left no time for visceral obstructions to be formed.

As a general principle, in the West Indies, in Africa, and indeed in all countries in which remittent fever is of the highest degree of intensity, the traces of diseased structure are always trifling, and limited to the stomach, the brain, the liver, or the spleen. When the stomach is affected, the mucous membrane of the pyloric orifice is for the most part inflamed, easily detached, and sometimes ulcerated. The contents of the stomach also are either a viscid mucus, or that black melanic matter which is sometimes thrown up, or else pure blood. In 7-10ths of those examined at Barcelona, in 1821, the stomach contained melanic matter, like soot mixed with water, or coffee-grounds, while in 1-8th it contained pure blood. The duodenum and small intestines, and not unfrequently the gall-bladder, were also inflamed. Dr. Barry and Mr. Rufz speak of having observed Brunner's glands to be enlarged, but never Peyer's. The small intestines also are filled with the same matters as the stomach, but more viscid and thicker, and more resembling tar; and in the large intestines these matters were often mixed with clotted blood. The liver and spleen have usually been found healthy. Louis states, that in the epidemic at Gibraltar he found the liver of a pale yellow colour, a circumstance he considers to be the great pathognomic sign of the disease. It is probable, however, that this generalization is hasty, for it was not observed by our own officers, and has since been found wanting in the epidemic at Martinique. The substance of the brain is in general healthy, and sometimes a little softened, while the membranes are only occasionally inflamed with the usual effusion of serum.

Symptoms.—The paludal poison, according to the dose, or else according to the susceptibility of the party, produces two distinct varieties of fever, or the intermittent and remittent fever. The former has many varieties, denoted by the different periodic intervals which elapse between each paroxysm, while the varieties of the latter are denoted by the greater length of the febrile paroxysm, and by the greater gravity of the disease alogether. The varieties of intermittent fever are,—

Febris intermittens quotidiana,
Febris intermittens tertiana,
Febris intermittens quartana.

The varieties of remittent fever are,—

Febris remittens mitior,
Febris remittens gravior,
Febris remittens gravior cum ictero.

The relative frequency of these different types varies greatly in different countries, as also their aggregate amount. In the Windward and Leeward command the admissions for intermittent fever form about two-fifths of the total number admitted labouring under fever. But it does not prevail equally in all the settlements belonging to this command, but is principally confined to the low marshy settlements of Demerara and Berbice, where it has been a great source of inefficiency, particularly since 1830; the number attacked in the course of the year having been often equal to the whole force of the colony. Intermittents also are very common in Trinidad, owing to the vicinity of the barracks to the marshes; but in the other islands they are comparatively rare, and in some almost unknown. In Jamaica intermittents form about one-seventh of the whole number, while at Bona, in Africa, they are as 3 to 2, and again in the Ionian Islands they are about 1 in 3½ nearly.

The minimum dose of the paludal poison gives rise to the simplest and least dangerous form of the disease, or to *intermittent fever*, of which the varieties are distinguished from each other by the interval of time which elapses between each paroxysm. For instance, when the paroxysm returns every 24 hours it is termed a *quotidian*, when every 48 hours a *tertian*, and when every 72 hours a *quartan;* and these primary types have been extended by early writers to every period comprised within a mensual or bimensual period.

Of these primary types it has been supposed that in this country the tertian is by far the most common, then the quartan, and lastly the quotidian. But this law is by no means general, for M. Maillot treated 2354 cases of intermittent fever occurring in the French army in occupation of a portion of the northern shores of Africa, and he found of that number 1582 were quotidian, 730 tertian, and 26 quartan. In the Peninsular war the quotidian was likewise the prevailing type, and at one time they were in the proportion of 16 to 1 of any other type. In the West Indies the tertian and the quartan are only about one-twelfth of the whole number of intermittents treated, the rest being quotidians.

Most authors who have written on intermittent fever have stated that the accession of the quotidian paroxysm occurs early in the morning, that of the tertian about noon, and that of the quartan in the afternoon, between 3 and 5 o'clock. But to this law there are many exceptions; for, according to Maillot, of 1582 quotidians 1089 occurred from midnight to midday, and 493 from midday to midnight; of 730 tertians 550 occurred from midnight to midday, and 180 from midday to midnight; out of 26 quartans also 13 were seized from midday to midnight, and 13 from midnight to midday. As the most general conclusion, the paroxysm returned in a great majority of the quotidian cases from 10 to 12 o'clock, and in the tertian from 9 to 12 o'clock.

The febrile paroxysm, or fit of intermittent fever, has three stages: a cold stage, a hot stage, and a sweating stage. These three stages are not necessarily of an equal duration, but vary greatly in different cases. The duration of the cold stage is from a few minutes to five or six hours, and in general, if the disease be severe, the shorter the cold stage the longer the hot stage. The hot stage may last from half an hour to any period less than 24 hours. The sweating stage is generally shorter than either of the former, and sometimes does not exist at all. The rule, however, is, that the quotidian has the shortest cold stage and the longest hot stage; the tertian a longer cold stage and a shorter hot stage than the quotidian; while the quartan has the longest cold stage and the shortest hot stage of all the varieties.

The disease may be sudden in its attack, and without previous illness, but more commonly it is preceded by general indisposition, headache, weariness, pain in the limbs, thirst, loss of appetite, white tongue and frequent pulse, high coloured urine and dark coloured discharge from the bowels. These prodromes are accompanied with well-marked exacerbations and remissions of fever, displaying a periodic tendency. After this feverish state has lasted from four days to a fortnight, the patient is seized with severe rigor, and the ague is manifested. The phenomena of a paroxysm are the following:—

The paroxysm, like the disease, may be of sudden invasion, and the patient in good health up to the time of attack; or it may be preceded by languor, debility, frequent yawnings, and great unwillingness to make the least exertion. In whichever way the cold stage begins the patient experiences first a sensation of coldness of the extremities, then of the back, and lastly of the whole body; at the same time the nails turn blue, the features shrink and become pale and sharp, and if the case be severe the whole body shrivels up, turns purple, and is "goose-skinned." The coldness increasing, the motor nerves of the fifth pair are affected, and the teeth begin to chatter; and this tremor extends to every muscle, till the whole body shakes with rigor. Cough, dyspnœa, and oppression of the præcordia now occur, with a painful sensation round the temples and down the back. The patient also often suffers from nausea and vomiting, and the latter symptom is speedily followed by the hot stage. When the cold stage has lasted a period varying perhaps from half an hour to two hours and a half, a re-action takes place, accompanied by partial warmth, or flushings. These extend, and at length the whole body acquires a heat greater than natural, or from 105° to 107°. As the heat returns so also does the colour; and the body, especially the face, becomes now preternaturally swollen and red. The hot stage being now formed, the heart and arteries beat with unusual violence, and headache, with a frequent full pulse, and all the distressing symptoms of continued fever, are present. "The mean duration of this stage is from three to eight hours. At its close a gentle moisture breaks out, first on the forehead, and thence extends till the patient lies in a general sweat, sometimes so profuse as to soak the bed and linen as completely as if they had been dipped in water. After the sweat has continued to flow for some time the fever gradually abates, a state of apyrexia ensues, and the paroxysm is terminated, and, a sense of exhaustion excepted, the patient feels restored to health. Sometimes, however, he continues pale, debilitated, and incapable of all exertion, till, on the recurrence of the paroxysm, the symptoms just described are repeated.

Upon the approach of the attack the pulse is slow and feeble, but as the sense of coldness increases it becomes small, rapid, and irregular. When the hot stage forms it becomes full and strong, and on the sweat breaking out it again becomes soft, less rapid, and at length natural. In the course of the paroxysm there is a considerable change in the urine, which, during the cold stage, is abundant, colourless, and without sediment. In the hot stage it is high coloured, but still void of sediment; but as soon as the sweat begins to flow a sediment, commonly lateritious, is deposited, and this deposition continues for some time after the paroxysm is terminated. The tongue, in mild forms of the disease, is clean in the cold stage, white in the hot stage, and again cleans after the sweat has flowed. In severe cases the tongue is white during all the stages, and also during the apyrexia, while in the worst cases the tongue is brown in all the stages. Excepting some unusual instances, attended throughout with diarrhœa, the patient seldom passes a stool till towards the close of the paroxysm, when it is generally a loose one. It frequently also happens during the cold stage that tumors subside, or ulcers dry up, but the tumor generally reappears, and the ulcers discharge as soon as the sweating stage is formed.

The paroxysm of intermittent fever, of whatever description, is conventionally considered to terminate in 24 hours; for, if prolonged beyond that time, it is termed remittent fever. The duration, however, varies in different types. Dr. Brown conceives the mean length of a quotidian to be 16 hours, that of a tertian 10 hours, and that of a quartan 6 hours. In London, however, this calculation is greatly in excess: for, in the majority of cases, the paroxysm, whatever be the type of the fever, seldom exceeds two to six hours, and consequently the mean is hardly more than four hours.

It is seldom that intermittent fever, of whatever type, consists of a single paroxysm, for usually it recurs many times, so that the whole duration of the disease, if left to nature, would be extremely long. Horace speaks of its lasting five months, while Sydenham extends this period to six months, stating, if bleeding has been used it often lasts for 12 months. Under the present improved treatment in London the disease is generally terminated after a very few paroxysms, perhaps three or four, the patient being now removed to an atmosphere free from the paludal poison. If the disease be neglected, the fever becomes complicated with dropsy, peritonitis, hepatitis, splenitis, inflammation of the lungs, or with dysentery, then the symptoms peculiar to those disorders will be added.

The Symptoms of Remittent and Yellow Fever.—A higher degree of the paludal poison, or a medium and a maximum dose, produces remittent fever, and its more intense form, yellow fever, for the latter disease differs in no respect from the former, except in the jaundice, which accompanies it, and in the remissions being less complete. There are so many grades of intensity in remittent fever, varying as it does from a severe intermittent to yellow fever, and so many different modifications impressed on it from the great variety of country by which the poison is generated, that it is extremely difficult to generalize the phenomena.

The severer forms of remittent fever may be preceded by languor, restlessness, or chilliness, symptoms which usher in a short cold stage; but in other cases the attack is sudden, and the patient, for instance, immediately after a hearty dinner may be seized most unexpectedly with faintness, vertigo, confusion of thought, and these almost without a rigor; a hot stage, usually of much greater intensity than that which accompanies the worst forms of intermittent fever, follows.

The hot stage is usually marked by much cerebral affection: as severe headache, a painfully acute state of every sense, an injected state of the conjunctiva, and great action of the carotid arteries. These symptoms are frequently accompanied by delirium, sometimes of a violent character, while in other cases the patient is oppressed with great drowsiness, lethargy, or coma. The stomach also often is the seat of great pain and uneasiness, followed by vomiting, and the matters vomited are either colourless or bilious, or else blood. The duration of this paroxysm varies considerably, and when the disease is mild it may terminate in six or seven hours, but if severe it may last 15, 24, 36, or even 48 hours; and Dr. John Hunter once saw a case in which there was no remission for 72 hours. The fever, however, at length remits, sometimes with sweating, but at other times without any sensible increase of perspiration.

The duration of the remission which follows is as various as that of the hot stage. Sometimes it does not last longer than two or three hours, more commonly it extends to 10, 15, 30, or even 36 hours. The fever then returns, and in some cases assumes a quotidian type, and has an exacerbation every day, and perhaps nearly at the same time, yet more frequently there is no regularity in the times either of its accession or remission.

The second paroxysm is always more severe than the first, if the progress of the fever has not been checked during the remission, and usually neither any cold stage, rigor, or even chilliness precedes it. On the other hand, all the febrile symptoms run much higher, the skin is hotter, the pulse more frequent, the headache greater, the senses more confused, and the delirium or coma, when that exists, more violent in degree and more sudden in its accession; and these symptoms sometimes persevere with or without the black vomit, till they terminate perhaps in convulsions, and at length in death.

This severe remittent fever is sometimes accompanied by a symptom which has given a name to this disease as though it were a distinct species, or a yellowness first of the eyes and then of the skin, and hence the term "yellow fever." The yellow fever, however, is simply a remittent fever, with the addition of jaundice, a variety remarkable only for its great severity, and for the sudden aggravation of all the symptoms. The jaundice may occur in the first paroxysm, accompanied by a sudden and almost total loss of strength, by stupor, subsultus tendinum, pain and irritability of the stomach by incessant retching, and that retching the black vomit, and so violent or profuse that the patient sometimes dies in twelve hours. More frequently, however, the jaundice does not appear till the second or third paroxysm, and the patient then sinks with all the bodily and mental affections incident to the last stage of typhus. Occasionally, however, the course is different.

Dr. Wilson has remarked, that the term insidious has often been applied to the West India fever, and with great propriety: for he states, that while the poison is frequently sapping the powers of life there is often little to inform us of the mischief that is going on within, so that the symptoms frequently do not prepare us for the fatal issue. "In the midst of our security," he adds, "and when we are imagining all is going on well, we are shocked by the sudden eruption of the black vomit, or the accession of profound coma, rapidly producing death." The insidious nature of the severe forms of paludal disease was remarked also by Dr. Barry at Sierra Leone. "The state of the patient's mind was also most peculiar, for the poor sufferer appeared entirely unconscious of his hopeless state, and generally expressed himself as being much better, until, the vital heat receding from the surface, dissolution took place, sometimes preceded by violent straining of the eyeballs and incoherent expressions, or else by some convulsive motions. At Gibraltar the patients sometimes died without taking to their beds, or "on foot," as it was termed. The following case is given by Louis:—Dr. Matthias, who died at Gibraltar after an illness of four or five days, experienced no other symptoms than severe pains in the calves of the legs and a suppression of urine. He had no nausea, and did not vomit, and his mind was clear during the whole course of the disease. He noticed, however, the suppression of urine, dictated three or four letters to a friend, begged him to write rapidly the last, that he might sign it, then devoted a short time to an affectionate intercourse with this friend, and soon after, becoming speechless, he thanked him by a sign, and in a quarter of an hour was dead.

In the interval of the paroxysm the patient in some few cases still retains some power, but more generally the prostration is great. Dr. Arnold says, that there is no disease in which the muscular power is so much impaired from the commencement to the termination, particularly if the invasion be brought on by syncope. Dr. Davy also says, "When I reflect on the severe cases, no other disease occurs to me, excepting spasmodic cholera, which gives such an idea of the energies of the constitution being overpowered as if by a subtle active poison."

This disease is in a few instances fatal within 24 hours, often on the third or fourth day, and in almost every case the patient, if he does die, dies before the seventh, or at most the ninth day.

Diagnosis.—If one paroxysm constituted an ague, there are many diseases which might be said to simulate intermittent fever, as erysipelas, pneumonia, and almost every acute affection; but the absence of a second paroxysm, and the formation of an entirely different disease, readily distinguish them. The last stage of the mild form of remittent fever cannot always be distinguished from typhus.

Prognosis.—No patient ought to die in this country from simple intermittent fever, provided he can be removed from the marshy district.

The mortality from intermittent, remittent, and yellow fever, according to the reports of the sickness and mortality occurring among the troops in the West Indies, the Mediterranean, and in North America, and presented to both Houses of Parliament, is as follows:—

Elementary Principles of Medicine.

Elementary Principles of Medicine.

Deaths from	Windward & Leeward Command.	Jamaica Command.	Gibraltar.	Malta.	Ionian Islands.	Upper Canada.	Lower Canada.
Intermittent fever . .	1 in 169	1 in 163	1 in 60	1 in 311	1 in 236	1 in 1143	1 in 535
Remittent fever . .	1 in 9	1 in 8	1 in 11	1 in 24	1 in 22	1 in 11	1 in 5
Yellow fever . .	1 in 2⅓	1 in 1⅓	1 in 1⅔	..	..	..	..

When troops are on actual service in tropical countries the mortality from severe remittent and yellow fever is often enormous. In the attack on Carthagena the troops remained on shore but 10 days, yet on re-embarking the sick were to the healthy as two to five, and ultimately one-fourth of the whole number died. In the late expedition to the Birman Empire, within three months of taking possession of Rangoon, more than 3000 men had died, or more than one-half the entire force.

Treatment.—There would have been no end to the miseries inflicted on mankind by intermittent fever had not the very antidote nature seems to have provided against the mild form of paludal disease been at length discovered. The plant cinchona, as well as its sanatory properties, is said to have been known to the natives of Peru long before the discovery of America, but to have been kept secret by them out of hatred to the Spaniards. The Jesuits, however, became acquainted with its specific virtues, and employed it in 1638 in the cure of Count El Cinchon, a Spanish peer and viceroy of Lima. The remedy was successful, and it became celebrated throughout Europe. It was first exhibited in powder in two-drachm doses twice a day, and was subsequently given as a decoction, as an infusion, as a tincture, and also as a wine, the bark being steeped in port wine. Of these various modes it was, however, determined that in severe disease the powder, when the stomach is not too irritable to bear it, is the most efficient, and the dose of the pulvis cinchonæ has been fixed by general usage at a drachm for an adult; and this dose given every four or six hours has been found, when persevered in for three or four weeks, or longer, to cure the great majority of intermittents in and about London. Occasionally this dose has been found inefficient, and it became necessary either to increase the quantity or to augment its efficiency by additional stimulus. Drs. Fordyce and Huck increased the quantity so far as to give half an ounce, and even an ounce, for a dose, and a few cases were cured by this means; but the stomach so often rejected this crude mass, and the incessant vomiting which often followed so constantly retarded the convalescence of the great majority thus treated that this excess of dose has in general been abandoned. It was then found that an additional stimulus was generally more efficient than an increased quantity of cinchona, and that a scruple of Cayenne pepper added to each drachm of bark frequently succeeded in curing an ague, when bark alone had failed. Sometimes, however, even bark combined with Cayenne pepper (piper Indicum) was inefficient, and in these obstinate cases opium was found to be an admirable adjuvant, and the triple compound of pulveris cinchonæ ʒ j. piperis indici ℈ j. c. opii gr. j. 4^{tis} horis has in general been found an adequate remedy for the most intractable intermittents met with in London.

The occasional failure of crude bark, notwithstanding the use of many auxiliary remedies, rendered some further additional power a great desideratum, and we owe to Pelletier and Caventou the discovery and isolation of *quina*, one of the alkaloid principles of cinchona, and which endless experiment has shown to be the real antidote to the paludal poison, when of such intensity as merely to produce intermittent fever; and the introduction of this substance into medicine has rendered all other modes of treatment, when the disease is not as yet complicated with organic lesion, unnecessary, at least in London. Quina sits easily on the stomach, even in large doses, and about five grains are esteemed equivalent to one drachm of crude powdered bark. There are two modes in which it may be exhibited, or in small and repeated doses at short intervals, or else in one large dose once in 24 hours. The latter method, however, seems the most preferable, for on a comparison of many cases treated by one, two, to five grain doses given every second, fourth, or sixth hour, with others treated with ten grains in one dose every night, it has resulted that one large dose of quina has effected the cure of the patient in less time than double the quantity given in small and frequent doses; thus not only demonstrating that the large dose is more beneficial to the patient and more economical of quina, but also that the cure must be effected rather by the impression made on the nerves of the stomach, than by the quantity absorbed. The disulphate of quina is the preparation generally used, and is probably the best; and 10 grains of this substance given every night often stops the fever at once, more commonly after three or four paroxysms, and always in the course of a very few days. It is unimportant whether this substance be given in pills, out of camphor mixture, or in solution by means of dilute sulphuric acid, in the proportion of one drop to each grain of the salt. It is necessary to add, however, that whether bark or quina be exhibited, or whether the dose be large or small, the patient should continue its use for a fortnight or three weeks after the last paroxysm, in order to guard against relapse, for the diseased actions appear to be suspended for some time before they are cured. It is desirable, perhaps essential, also, that the patient should be removed from every source of the paludal poison. The medicine should be given during the state of apyrexia.

When intermittent fever becomes complicated with secondary affections of the paludal poison, so that inflammation of the peritoneum, of the pleura, or else dropsy of those membranes, ensues, the treatment by quina must be either modified or abandoned. If inflammation be the result, local or general bleeding must be had recourse to, yet not to any extent, for as the inflammation depends on the action of a poison, the utmost we can hope to effect by that operation is to moderate the symptoms. This limited bleeding is to be followed by the exhibition of mercury, so as to affect the mouth. Five grains of calomel, given once or twice in the 24 hours, is generally sufficient, but the quantity and frequency of the exhibitions must be proportioned to the severity of the attack, and there are very few cases which do not yield as soon as the gums are affected. The beneficial effects of calomel are indeed so striking, that a much greater latitude may be allowed than in similar cases of simple phlegmasiæ, with respect to refraining from bleeding.

If the secondary action of the poison produces merely disordered function of the serous membranes, ending in dropsy of the abdomen or chest, bleeding is unnecessary or injurious, while mercury is still the most useful, and indeed essential agent; for few cases of paludal dropsy resist, in London, the action of five grains of calomel, repeated every night till the mouth is affected; and this medicine is much to be preferred in these cases to squills, elaterium, digitalis, or any of the large class of neutral salts, which are found so useful in the simple forms of dropsy. It is necessary, should intermittent fever and dropsy co-exist, that quina be exhibited in combination with the calomel; if otherwise, it is unnecessary.

When the paludal poison so deranges the functions of the liver as to occasion jaundice, mercury is still the only beneficial remedy; nor are large quantities of it necessary, for five grains of the pilula hydrarg. or two grains of calomel every night, are in general all that is necessary to remove the complaint. In this case, should the febrile paroxysm continue, the one large dose of the disulphate of quina every night should be still exhibited.

It is unusual to meet in London, in the present day, with intermittent fever accompanied by *acute* hepatitis or splenitis, so that we have few opportunities of determining the most satisfactory modes of treating them; but it is apprehended that bleeding and mercury, or mercury and the disulphate of quina, will, according as the fever is or is not present, be found the most efficient remedies, at least for hepatitis, whether acute or chronic. We possess, however, no satisfactory mode of treating acute splenitis, and when that disease becomes chronic, the case is still more hazardous. It seems determined that mercury and bleeding in these cases are both decidedly injurious, so much so that the Indian practitioners employ a spleen powder, composed chiefly of equal parts of sulphate of iron, of cream of tartar, and of *jalap*. In this country that compound has not supported the character it has acquired in India, and some few apparently hopeless cases have been successfully treated by the iodide of potassium, gr. viij. ter die. Dr. Williams, of St. Thomas's Hospital, has published some few cases in which the bromide of potash, in doses of five grains, out of camphor mixture, appeared to have considerable influence over these large and indurated spleens. After the ague has been cured there often remains a troublesome and protracted nervous affection of one side of the head, bounded by the sagittal suture, though not unfrequently occupying the occipital portion. A continuance of quina is more useful in removing this affection than bleeding, cantharides, or blisters.

Cure of Remittent Fever.—Quina is unquestionably a most efficacious remedy, indeed a specific, in the cure of simple intermittent fever, and bleeding and mercury in removing most of its consequences. It is to be regretted, however, that these remedies, either separately or combined, are much less efficacious in the cure of the severe remittent forms of the disease; yet, as they are the most powerful agents we possess, it is desirable to ascertain their respective values.

The ancients generally bled, but most unsuccessfully, in intermittent fever; and Sydenham, Morton, and Cleghorn immediately abandoned that operation on the introduction of bark. Bleeding, therefore, having failed in the mild forms of the disease, little could be expected from it in the more severe ones; and this operation, when practised on a large scale, appears to have effected little good. "In the Walcheren expedition," says one of the medical officers, "I bled patients and saw others bleed them, but it was only to see them die." In the Rangoon expedition bleeding was the favourite remedy, yet in less than three months one-half of the British force were laid in their graves. Mr. Ameil says, that at Gibraltar bleeding, both in large and small quantities, was tried, and under the most marked indications, but "I experienced no favourable results." In the treatment of the French troops employed in Africa, M. Maillot says his patients became so frequently delirious or comatose, and in this state were carried off in a few hours, that he entirely abandoned the practice. Dr. Davy also considers bleeding, in the remittent incident to the Ionian Islands, to be decidedly injurious. In the East Indies, in the West Indies, and in Africa, and indeed to whatever quarter we turn, we find the large majority of practitioners adverse to the practice of bleeding. Many speak of it as not producing much mischief, if moderate in quantity and early in its application; while only a few advocate its extensive use. It may be affirmed, then, as a general principle, that bleeding to any amount is either inefficient or injurious in every form of paludal fever. Some depletion, however, either by the lancet, cupping, or leeches, may be necessary to save a threatened organ; but bleeding, carried to the extent which might be borne in the simple phlegmasiæ, seems quite unwarranted, not only by the laws of poisons, but by the experience of the profession generally.

The property which mercury possesses of controlling many of the secondary affections in intermittent, has caused it to be extensively employed in the cure of the remittent and yellow fevers, but with extremely questionable success. In the Walcheren expedition it was largely used and fairly tried, yet it was admitted to have most egregiously disappointed the hopes of the medical officers. It appears, also, to have been used with an equal or greater profusion in the Rangoon expedition, and with what lamentable result has been already mentioned. In the West Indies Dr. Chisholm has given as much as 6000 grains of this metal, externally and internally, in a single case of yellow fever; and in America it has been almost equally largely employed. It has appeared to result, that mild cases have recovered under this treatment, as they would, perhaps, have done under any other; but in severe cases it has, for the most part, been unsuccessful, and in many instances palpably injurious, and is now more commonly used as a purgative than as an antidote.

Bleeding and mercury, either separately or conjointly, having been proved to be inefficient, crude bark was very generally used between the tropics in the cure of remittent fever, sometimes throughout the disease, and at other times only during the intervals; and it has been asserted that more recoveries took place under this treatment than under any other; still, however, the great irritability of the stomach often caused it to be rejected in every stage, and the life or death of the patient often appeared to turn on the quantity of wine or other nourishment that could be got down during the remission. The introduction of quina in the cure of this affection has had many prejudices and difficulties to contend with, from the previous frequent failure of bark, but it promises to produce a new epoch in the treatment of the remittent fever. In the East Indies it has been found to possess the means of controlling that disease to an extent hitherto deemed impossible. In the West Indies, also, it is now generally used, and its great powers admitted; and on the coast of Africa, in the treatment of the French troops, M. Maillot conceives he has reduced the mortality from one in four and a-half to about one in twenty-two, by the use of this remedy. The dose, however, given by this gentleman is enormous, for in bad cases he gives from one to two scruples by the mouth, and 60 grains as an enema; and in this manner he has in several instances given as much as 148 grains in the 24 hours. These large doses he states to have been generally successful, and never produced any engorgement of the viscera, dropsy, diarrhœa, or other unpleasant symptoms.

It is impossible, after such evidence, to doubt the great value of quina in the cure of remittent fever. The battle, however, still rages between those who would still treat this disease symptomatically, or by moderate bleeding, effervescing draughts, purgatives, and also supporting the patient in the remission by wine, strong broths, and those who prefer the specific remedy. The increasing intelligence, however, of the medical profession, will in a few years determine the circumstances, and the time, and the dose in which this remedy should be exhibited; and if we make a due allowance for that severe form of disease which renders all remedies powerless, we shall eventually see it occupy a high place in the cure of remittent fever.

Dietetic Treatment.—There is something extremely inimical in an animal diet in every case of disease from a morbid poison; and consequently, though broths may be useful and necessary during the intermission or remission, the diet of the patient from the commencement till the termination of the disease, whether remittent or intermittent, should be strictly antiphlogistical, and limited to a milk diet, slops, vegetables, and jellies, and, according to the discretion of the practitioner, to some wine.

Preventative Treatment.—The question of prevention necessarily involves the doctrine of the contagious or non-contagious nature of paludal fever generally. The milder forms of paludal fever are certainly not contagious; for the London Hospitals often contain a considerable number of cases of intermittent fever; yet in no well-authenticated instance has that disease been known to spread to any patient in the ward, or to any medical or other attendant. On the return of our troops from Walcheren, labouring under every grade of remittent and intermittent fever, not one orderly, nurse, or medical attendant suffered from either of these fevers, who had not been previously exposed to the action of the paludal poison,—the contrary, it will be remembered, of what happened when they returned suffering under typhus from Spain.

In the West Indies it is the common practice to send convalescents from the towns to the mountains; but no instance is known of yellow fever spreading in those higher districts. In the West Indies, also, it was formerly the custom to place the fever as well as the other patients in contiguous beds, and even in tier over tier; yet no instance has been observed of the disease spreading. In the years 1796-1797, when the army under Sir Ralph Abercrombie suffered dreadfully in the West Indies from fever, the Inspector-General reported to the Army Medical Board the opinions of the medical officers on the staff on the subject of contagion, and that report states, "Contagion or infection has had little or no share in the mortality; and I must beg to add, that it has never occurred in a single instance to my observation."

The remittent and yellow fever rages in some parts of the East Indies as well as in the West Indies, yet the most intelligent officers have never remarked any appearance of fever from "a specific or contagious source in India." The evidence of the non-contagious nature of these diseases is equally strong on the continent of America. In the United states the fever hospitals have been built two or three miles in the country, and entirely beyond the local contaminated atmosphere of their respective cities. But in none of these establishments is there a single example of a person employed about the yellow-fever patients being attacked with this disease, unless he had been previously in an infected district. This appears to be so absolutely the case, that the President of the United States announced to both Houses of Congress in 1805, "That in the course of the several visitations of this disease, it has appeared that it is strictly local, incident to cities and tide-waters only, and incommunicable in the country, either by persons or by goods."

In addition to this testimony, many physicians, surgeons, and nurses have received the black vomit on their hands, faces, and clothes; some have inoculated themselves with it, and others have swallowed it, and yet no ill consequence has resulted. Beds, also, on which the yellow fever patient has died, have been occupied, still unpurified, by persons in health or patients labouring under other disease, and yet no unpleasant consequence has resulted. There seems no ground, therefore, for entertaining, in the remotest degree, the doctrine of the contagious nature of paludal fevers.

The only preventative treatment, therefore, is to avoid those localities which engender the paludal poison; and in Rome this precept is so well known that the wealthy inhabitants leave that city to reside during the summer in the country; while in Jamaica, from July to October, the only chance of avoiding an attack, in certain districts, is an early removal to the mountain residences in the interior. If, however, change of place is impossible, and we are obliged to reside within the range of the miasmata, we ought to avoid exposing ourselves to the night air, especially if we have previously suffered from the disease, for the tendency to relapse is great. It should also be remembered that a relapse commonly takes place on days corresponding to the paroxysm; hence great caution is necessary to avoid exposure to cold, fatigue, improper diet, easterly winds, great mental anxiety, or other excitement on those days. Europeans embarking for the West Indies should remember that the autumn is the sickly season, while January, or the beginning of winter, is the season of greatest health, and affords the greatest chances of the constitution becoming *acclimatée.* The adoption of these precautions must undoubtedly diminish the chances of attack, but the only true preventive is drainage, and, where that cannot be effected, the keeping the waters of the marsh up to a given level by means of flood-gates or other mechanical contrivances.

OF THE PALUDAL POISON.—*Dysentery.*

It has been seen that the paludal poison, according to its intensity, produces the various forms of intermittent, remittent, and of yellow fevers; but so singular are the laws of this noxious agent, that fever is not the only disease which it inflicts on the human frame, for, owing to some modification either of quality or quantity, the miasm also gives rise to dysentery, a disease which consists of an inflammation of the mucous membrane of the colon, and whose course and phenomena are frequently unaccompanied by any febrile symptom whatever. It is doubtful, indeed, if the morbid actions of this poison end here, or whether many forms of hepatitis and of splenitis ought not to be referred to its baleful influence. It is now intended, however, to treat of dysentery only.

Remote Cause.—It may be stated, as a general proposition, that there is no country where paludal fever exists that dysentery is not an endemic and prevailing disease. In the East and West Indies, in China, the Ionian Islands, Gibraltar, Malta, the Canadas, Holland, the coasts of Africa, as well as in many different parts of France, of the Peninsula, of the continent of America, and of the eastern parts of Great Britain, the prevalence of intermittent fever and of dysentery is notorious. This connexion is so intimate that a given number of persons being exposed to the action of paludal miasmata, as a boat's crew sent ashore in a tropical climate, the probabilities are that on the men returning on board part will be seized with dysentery, and part with remittent fever.

Paludal fever and dysentery, moreover, are not only conjoined in locality, but they often also co-exist, precede, or follow each other in the same individual, so that the fever frequently ends in dysentery, and the dysentery in remittent fever. This proof of the common nature of these diseases is corroborated by every writer of any celebrity, and more especially by those who have detailed the diseases of our armies. It seems distinctly proved, therefore, that dysentery is a disease of a specific nature, and originates in some peculiar modification of the paludal poison. It seems also determined that dysentery prevails generally in the inverse ratio of the intensity of paludal fever. In Jamaica, for example, where the white troops suffer in the large proportion of 91 per cent. annually from paludal fevers, the cases of dysentery are to those of fever as one to nine; while in the Madras presidency, where the troops suffer from fever in the much less ratio of only $30\frac{4}{10}$ per cent. annually, the cases of dysentery are to those of fever as 47 of the former to 30 of the latter. It appears also that dysentery is less common in the hotter than in the colder months, or arises under circumstances less favourable to vegetable decomposition. Thus in India and China it is from the middle of November to the latter end of February, or when remittent fever changes into intermittent, that dysentery greatly prevails.

Predisposing Causes.—Our knowledge of these causes is derived from what principally occurs in the military and naval service; and from the sufferings of the troops we learn that exposure to the night air, to wet, or to fatigue, together with the intemperance and improper diet incident to the life of a soldier, especially on active service in the field, have at all times been found to be powerful predisposing causes to dysentery.

The effects of *salt* diet in the production of dysentery being less known than the other predisposing causes, it may be as well to state, that by an experience of 20 years in the West Indies, it has been determined that in the Windward and Leeward Command, where the rations issued to the troops consist of salt provisions five days in the week, the mortality from diseases of the stomach and bowels among the officers is as two to four per cent., while that among the soldiers is as 20·7, or a tenfold ratio. On the contrary, in Jamaica, where salt provisions are issued to the troops only two days in the week, the mortality from the same diseases approximates so nearly between these two ranks as to be almost an equality. And corresponding facts to these have been observed in Gibraltar, on the coast of Africa, and at St. Helena.

In the navy also the same effects of ill-regulated diet have been observed. "In 1797," says Dr. Wilson, "the victualling (of the navy) was changed, greatly improved, and consequently immediate to the change the health of the seamen improved strikingly. Scurvy, typhoid fever, *dysentery*, and ulcer, which, up to the period of the change, had produced great havoc, became comparatively rare in occurrence and light in impression," and, it may now be added, are hardly known except by name.

The last appearance of dysentery in London was apparently owing to an insufficient diet, and occurred at the Penitentiary, Milbank, shortly after its completion. This prison is built on a marsh below the level of the Thames at high-water, the river being banked out by a narrow causeway. As long as the prisoners were allowed a full and ample diet they appear to have resisted the action of the paludal poison, and to have enjoyed good health. No sooner, however, was the quantity and quality of their dietary lowered than dysentery of a very fatal character broke out, and made it necessary to clear that establishment for a time of all its inmates.

There are few facts to enable us to determine the proportions in which the different ages suffer from dysentery, but the returns of the troops from the Mauritius show that the mortality from this disease falls principally on soldiers advanced in life.

	AGE.			
	18 to 24	25 to 33	33 to 40	40 to 50
Aggregate strength of 7 years . . .	3892	5361	1215	300
Died of Dysentery	26	63	24	8
Ratio per 1000 of mean strength . . .	6·7	11·8	19·7	36·6

Infecting Distance.—The paludal poison, when it produces dysentery, is subjected to the same laws as when it produces paludal fever. It is *absorbed* by the same tissues, *co-exists* with the same poisons, and the human frame, instead of having its *susceptibility exhausted*, is unhappily liable to repeated attacks of dysentery, as well as of other forms of paludal disease.

Period of Latency.—The time which the poison lies latent in the system before it produces this form of disease is probably as various as that which precedes paludal fever. In many instances a large army has been affected in a few hours, while, from the many cases which occur on shipboard, and at long dates after the ship has left the land, it is probable the extreme periods may vary from a few hours to a few weeks, or even a few months.

Pathology.—The theory of this disease is, that the paludul poison, in a less dose than that which produces the mildest form of paludal fever, is absorbed by the mucous membranes and infects the blood, and after a given period of latency causes dysentery or inflammation of the mucous membrane of the colon. In a few cases likewise, either from continuity, sympathy, or a specific action of the poison, the mucous membrane of the stomach, or of some portion of the small intestines, becomes occasionally involved in the disease. The liver and spleen are also occasionally the seat of inflammation and of abscess, but whether from sympathy or a specific action of the poison is not determined.

The inflammation of the mucous membrane of the alimentary canal in dysentery may assume any form and degree incident to their structure, as the diffuse, the serous, the adhesive, the purulent, and the ulcerative, and it is not unusual to find most of these different degrees existing in different parts of the alimentary canal at the same time. These inflammations may also attack either the free or the adherent surface of the mucous membrane, or else its glandular structure; and these different parts may be either separately or conjointly affected. The pathological phenomena, however, vary in some degree, according as the patient falls in the acute or chronic stages of the disease.

When the patient falls in the acute stage of dysentery, or within the first few days of the attack, and while he is yet passing blood, mucus, or a loose watery lymph, or all of them, but before pus has appeared in the stools, the mucous membrane of the colon is found to be diffusely inflamed in patches varying from a shilling, or the palm of the hand, till the entire surface of the colon is affected. The colour of the affected part is of a deep cherry or venous red, and in some instances so nearly approaching to black as to appear sphacelated. This membrane is also thickened, and its cohesion so impaired that it appears almost gelatinous. The diameter of the intestines is also contracted.

The glandular structure of the alimentary canal is not necessarily affected in dysentery, still it is more commonly diseased; and in such cases the follicles are either enlarged and transparent, or else enlarged, hard, and opaque, according to the degree of inflammation. The contents of the colon in this stage are blood, mucus, and a loose watery lymph, together with a small portion of fæcal matter. Many early writers speak of having found scybalæ in large quantities, but modern observation has shown this circumstance to be extremely rare. The mesenteric glands are gorged, but seldom enlarged in this stage, while the mesentery itself often presents many red points, evidently the result of inflammation.

The second stage commences when pus appears in the stools. In this country suppuration seldom takes place without ulceration; but it is not improbable, from the quantity of pus passed by stool, sometimes many ounces, that pus may be secreted without ulceration: and Dr. Cornuel states he has examined cases in Guadaloupe in which no ulceration has been found, and yet pus in considerable quantity was contained in the colon. In this country the pathological character of the second stage is ulceration of the mucous membrane, and very commonly also of its glandular structure. The ulcers are usually situated at the free surface of the membrane, and they usually first appear as a number of small points, intensely red, which soften, and ultimately ulcerate. The ulcers may be deep or superficial, and their edge may be sharp and defined, as if made by a punch, or else broken down and almost diffluent. In dysentery, says Chomel, the mucous membrane often presents an appearance of erosion, which is an illusion; for if we gently pass the handle of the scalpel over it we detach a reticulated false membrane, and find the mucous membrane below it red and softened, something like gooseberry jelly.

As the disease advances the extent of ulceration is often quite astonishing; the whole of the mucous membrane, from the cæcum to the rectum, seems one universal series of ulcers, of which a few are occasionally found cicatrized, while others, perhaps, have burrowed so deeply as to rupture the peritoneal coat. The whole intestine is also thickened, contracted, and firmer than natural.

The adherent surface of the mucous membrane is rarely inflamed in the acute stage beyond that degree which impairs its cohesion. In the second stage, however, it is frequently the seat of a number of small abscesses, which give to the intestine that tuberculated appearance described by Pringle. The mucous membrane covering these abscesses at length inflames, softens, points, and bursts, and the pus escaping, abscesses of considerable depth are formed, and often in large numbers. The glandular structure is also frequently concomitantly affected and ulcerated.

When the small intestines partake of the inflammation the lower portion of the ilium is the part most commonly affected; and the mucous membrane of that part is either of a deep venous colour, or else *ardoisée*, according to the length of the disease, and it may at the same time be indurated or softened, thickened or ulcerated. In one case, Dr. Cheyne says, he found an exudation of lymph extending nearly over the whole of the jejunum.

If the stomach participates in the disease the mucous membrane may be merely diffusely inflamed, or of a red or violet-colour, its surface granulated, and its texture broken by the slightest touch. More commonly, perhaps, the colour of the mucous membrane is natural, but on its surface a number of ecchymoses or else small ulcers are seen with edges as sharp, clean, and perpendicular as if made with a punch.

The peritoneum, unless it has ruptured, is seldom either inflamed or thickened, but often presents many injected or ecchymosed points, which, when the intestine is opened, prove to be the base of some deep-seated ulcer. If the disease has terminated in dropsy the peritoneum is then commonly white, opaque, and thickened, or else injected, and perhaps granulated, the cavity containing a large quantity of albuminous serum.

The mesenteric glands are often found enlarged, red, and softened, sometimes resembling a clot of half fluid blood, and sometimes they are said to have been met with as black as charcoal.

Sir James Macgrigor examined 22 bodies that had died of dysentery in the East Indies, and found the liver diseased in sixteen; and from this and similar circumstances, many pathologists have inferred that the liver was in all cases primarily affected, the dysentery being merely an accident, and caused by obstruction of the portal system. In the Peninsular war, however, the liver was often found free from the most trifling appearance of disease. At other times, indeed, it was altered in colour, but not changed in structure; and again, its colour being natural, its structure was found diseased, the viscus being either larger or smaller than usual, and indurated or softened, and sometimes the seat of abscess.

The spleen and pancreas are sometimes found diseased; and Mr. Twining notices the former as one of the most fatal complications of dysentery in the East Indies. These viscera are found either enlarged and softened, or enlarged and indurated, the spleen being sometimes the seat of abscess. It seems probable that the diseased states of the spleen must be owing to a specific action of the poison, for there does not appear to be any necessary connexion between that organ and the colon.

Symptoms.—Dysentery is divided by all authors into two stages. The first stage is that which precedes the appearance of pus in the stools. The second commences with the appearance of pus. The first stage is usually short, and seldom exceeds ten days or a fortnight, while the second stage may last from a few days to many months. It is important to mark this division into stages; for the chance of being able to cure this intractable disease depends on our being able to arrest it before the appearance of pus.

It is remarkable that a disease so fatal should in the first instance cause little disturbance of the constitution, so that fever is seldom present, and is always moderate when it is so. Dysentery is therefore essentially a *colitis*, and for the most part the symptoms are local. Its attack may be sudden, and the disease ushered in by a short rigor, but more commonly it is preceded by some diarrhœa, or a few bilious stools, causing a burning sensation of the anus.

The preliminary stage passed, the stools become more numerous, often 10 to 20 in the 24 hours, and according to Dr. Cornuel, sometimes in the West Indies they amount to upwards of 200 in the same period, the patient being incessantly "*sur le siége.*" The stools are passed in general with great effort, and consist of mucus, or a white glairy matter mixed with blood. By degrees the quantity of blood increases, till at last a pure black blood of loose consistency, and having sometimes a peculiar fœtid gangrenous odour is passed. This excretion is accompanied by much pain or tormina of the abdomen; by great tenesmus, and by great efforts at defæcation, so that at length procidence of the rectum may take place, and greatly add to the sufferings of the patient. In the West Indies, according to Dr. Cornuel, portions of mucous membrane, varying from a few lines to a few inches, are often passed in this stage, in a gangrenous state, when the abdomen becomes tense, meteorized, irritable, and the patient has an incessant desire to pass urine, which is always scanty, high coloured, and sometimes suppressed.

Inflammation, however, when strictly limited to mucous membranes, is not necessarily accompanied by pain, so that the patient is occasionally destroyed by acute dysentery, without suffering any abdominal pain. Pain, however, is a symptom which frequently exists, sometimes slight and transient, and relieved by pressure; at others severe and constant, and increased on pressure. Its more usual seat is the umbilicus, occasionally above or below it, or else to the right or the left of the mesial line; it often also extends down the thighs. The different complications of amount of pain, and number of stools, &c., cause dysentery in different countries, and in different persons in the same country, to vary from little more than diarrhœa, to the severest forms of colic, or even of cholera.

If the patient recovers, the symptoms are mitigated, the pain ceases, the number of stools diminish, and the flow of urine is restored. On the contrary, if the disease terminates fatally in this stage, hiccough, vomiting, a small and rapid pulse, and pale sharp features, denote the impending close of the disease. The intellect, however, is perfect, and the patient, often deploring the fate which he sees inevitably to await him, dies after a short agony.

At the end of a few days, however, pus may be seen in the stools, and the second stage be formed, and the patient is now plunged into the greatest danger. The pus passed in mild cases is often small in quantity, but more commonly it amounts to several ounces in the 24 hours, and may be voided with or without fæcal matter, blood, shreds of lymph, and lumps of a sebaceous substance, the number of stools continuing unabated. It is singular for how long a time the patients met with in London continue to possess much embonpoint, appetite, freedom from pain, and from all constitutional affection, notwithstanding the long-continued action of so powerful and exhausting a disease. At length however, the scene advances to a close, and the stools become more frequent, the tenesmus more distressing; pain, perhaps up to this period altogether wanting, becomes severe and constant, and occupies a large extent of the abdomen, or else perhaps an abscess of the liver silently forms without pain, and the first indication of its existence is its pointing, and the sinking of the patient. Whichever of these events takes place, the patient becomes rapidly altered and broken by his sufferings, is strikingly emaciated, and often earnestly prays to be relieved from a life disgusting to himself and entirely despaired of by others. On the contrary, the patient in a very few rare instances recovers, the local symptoms gradually yielding, till his health and strength are ultimately restored.

Diagnosis.—It is difficult, perhaps impossible, in the first stage, to distinguish dysentery from diarrhœa; but the blood, the number of the stools, and small quantity of fæcal matter passed, will, in times when dysentery is prevalent, allow the calm observer very closely to approximate to the true nature of the disease. When pus appears in the stools, unless some fistulous or other abscess has burst into the intestine, there can be no doubt of the nature of the affection.

Prognosis.—The prognosis depends much on the country in which the disease occurs, but in hot climates it is calculated that only 1 in 20 or 25 falls. On actual service these chances are much diminished. In the chronic forms it is supposed that three out of four recover; but this is a proportion much more considerable than is obtained in the London hospitals.

Treatment.—Perhaps there is no question on which the profession are so much agreed, as on the inutility of large bleedings in dysentery. There are many authors who, with many limitations, recommend one general bleeding; but in almost every writer we find local bleeding the rule and general bleeding the exception; while many physicians omit both these operations.

As quina is unquestionably a specific remedy in the cure of the milder and uncomplicated forms of paludal fever, it might be presumed to have a most direct and beneficial influence in the cure of dysentery; but so singular are the laws of the paludal poison, that as a general rule, its exhibition in any form or quantity, and in any stage, has proved rather injurious than sanatory.

The favourable and almost specific actions of mercury in many of the secondary actions of the paludal poison make an investigation into the effects of this substance in the cure of dysentery a matter of much interest, especially as it has been extensively used, and in many cases with unquestionable benefit. We regret, however, that much difference of opinion exists as to the circumstances under which it should be administered. Some prescribe it in the acute stage, others restrict its use to the chronic stage, some give it in every stage, while others think it ought to be withdrawn when the tormina is relieved. Some also give it in scruple doses, others more moderately, but push it till the mouth is affected, while others give it only in small doses. In the midst of all this confusion Sir James Macgrigor seems to think this medicine is applicable only to the dysentery of particular countries, and that the dysentery of India and of Europe are different diseases,—dysentery being readily cured by calomel in India, while in the Peninsular war, that medicine was only decidedly useful in dysentery complicated with liver complaints. If given under other circumstances, or in the early stage and before venesection, or in the more advanced stage, particularly when there was hectic, with extensive erosion or ulceration of the intestine, it was invariably found to aggravate the symptoms and to hasten the fatal termination. Ipecacuanha also was formerly much in vogue as a specific in the treatment of dysentery, but it has no pretensions to any such property. It follows that neither bleeding, quina, or calomel, are antidotes to this form of paludal disease, and consequently that there is no exclusive plan of treatment applicable to all cases. Admitting, therefore, the necessity of occasionally employing general and local bleeding, and also calomel, in cases of hepatic complications, we have beyond this only the general principles to guide us of allaying irritation and of controlling, if possible, the diarrhœa; and the best general rules that we possess are those recommended by Sir James Macgrigor to be adopted in the army, and acknowledged by him to be derived from Dr. Somers.

"We commenced," says Sir James Macgrigor, "by copious venesection, and immediately afterwards gave pulv. ipecac. comp. gr. xij. every hour, which was repeated three times, with plenty of barley-water, and profuse sweating was encouraged for six or eight hours. A pill of three grains of calomel and one of opium was administered every second night, and in the intervening day ʒ ij. of sulphate of magnesia dissolved in a quart of light broth. The venesection was to be repeated while the state of strength and pulse permit it, until the stools are free, or nearly so, from blood, following up Dover's powder as a sudorific.

"In cases where the pains were excruciating and attended with tenesmus, the warm bath gave instantaneous relief. This plan being steadily persevered in for a few days the inflammatory diathesis of the intestinal canal, which had excited symptomatic fever throughout the general system, was found to relieve and make way for returning health. In this stage gentle tonics, with light nourishing diet cautiously exhibited, and at first given but in very moderate proportions, were introduced with the happiest effects.

"This disease was not unfrequently cut short by the above plan. If, however, the second stage advanced, and the disease became chronic, a different mode of treatment was pursued, and not unsuccessfully, if the disease had not been of long duration, the intestinal canal not much disorganized, or not complicated with other diseases.

"The first indication in this stage was to relieve the tenesmus and procure easy stools, and with this view ipecacuanha was given, sometimes with calomel, sometimes without it. The neutral salts were given, or oleum ricini, jalap, and various other medicines of the same class. The second indication was, to relieve the number of the stools and to restore tone to the alimentary canal. With this view Dover's powder, pulv. cretæ comp. c. opio—astringents and demulcents, with aromatics, were given, occasionally interspersing laxatives, and obviating particular symptoms as they occurred. Lastly, an infusion of bitters was given to restore tone to the relaxed intestine."

In addition to these remedies Sir James Macgrigor states, that the balsam of copaiba, an infusion of Calumba, hæmatoxylum, kino, and catechu, assisted by opium occasionally, gave much relief, and also the throwing up a variety of enemata, and especially one of a strong solution of superacetas plumbi; while in cases of liver affection he adds, "that friction of the abdomen, with mercurial ointment, gave the least irritation, and at the same time produced less debility."

Such is a statement of the practice pursued in dysentery during the Peninsular war, and on a scale whose magnitude has seldom been surpassed, even in modern times. If, however, we look to the returns, we find it highly probable that not more than two out of three of those attacked ultimately recovered.

In general the dysenteric patient is not admitted into the London hospitals until the disease has passed into the second stage; and in candour it must be allowed there is no class of disease which offers so few chances of recovery. On the Continent the neutral salts and mild purgative medicines are highly spoken of; but it is difficult to understand how these substances, having no specific power over the disease, can be beneficial in a highly ulcerated state of the intestine. Of all the purgatives, however, two ounces of an infusion of ipecacuanha, ʒ j. to lb. j. of boiling water, combined with ♏v. to ♏x. of the tinc. opii, and exhibited every six or eight hours, appear to be best; but the disease, though mitigated, is seldom cured by this means. Mercury also, in whatever dose or form exhibited, has not appeared to take up the disease, or only temporarily to benefit the patient. Vegetable tonics, containing tannin, as kino, hæmotoxylum, or catechu, however prepared or combined, give temporary relief, but are ultimately inefficient. The mineral acids are also seldom useful. Among the mineral astringents the sulphate of copper has been much spoken of; but during the Walcheren expedition, when it was prescribed, from some supposed virtue, for the cure of intermittent fever, its use was abandoned, on account of the severe diarrhœa which followed its exhibition. Enemata, it may be stated, of whatever description, have almost universally failed even in relieving the patient. Of the remedies less known and less used, the salicine in doses of five grains every four, or every six hours, appears to have the property of curing the milder forms of dysentery, when opiates give but little relief. A few cases have been treated in St. Thomas's Hospital, by balsami Canadensis, gr. v. opii gr. ſs. 6^{tis} horis, and the patients so treated have recovered. Dr. Fahnestock, of Pittsburgh, says he treated from 60 to 80 cases of well-marked dysentery, after preliminary purging with calomel or castor oil, with ʒ ſs. of spiritus terebinthinæ, and that a very large proportion recovered.—*Med. Gaz.* Feb. 1844.

Dietetic and Preventative Treatment.—The patients should be limited to slops, milk, broths, and at most a fish diet, with a small quantity of wine or brandy. They should carefully avoid cold and wet and night air. In paludal districts they should also be warmly clad.

Of the Poison of Cholera Indica.

The formidable disease to which this poison gives rise is remarkable for its sudden and great eruption in Bengal in 1817, and for its subsequent fearful spread not only over the Peninsula of India, but also over the greater part of the habitable globe. The medical history of India is so imperfect, however, being up to 1774 limited to *two private letters*, written by Dr. Paisly, copies of which were in the hands of most of the older surgeons practising in that country, and to the imperfect works of Bontius, that many persons have doubted whether this peculiar disease is or is not of secondary formation.

There are traces of cholera in India, however, in the most ancient records of the Brahmins. While Mr. Curtis has given an account of a disease which he witnessed in the years 1782-3, both at Madras and Ceylon, so perfectly identical with the cholera Indica of the present day, that there is no question that this disease must have existed occasionally endemically or epidemically in India at former periods. The remarkable fact, however, of its spread from India generally over the globe, and at all seasons of the year, is an entirely new circumstance in its history.

Remote Cause.—The remote cause of this disease is unquestionably a poison, for at no former period has a person in good health in this country been known to become in a few minutes shrivelled up; his whole body to be of an icy coldness; his face and extremities to turn purple, and with or without vomiting of a peculiar fluid like rice-water, to die in a few hours. Neither is it explicable on any other hypothesis than that of a poison that this disease should spread over countries, which, in respect to climate, soil, geological formation, and also to the moral and physical habits of the population, are the most opposite to those where it first originated. Assuming, therefore, that Cholera Indica is produced by the action of a poison, whence does it originate, and how is it generated?

This disease having broken out in the Suderbunds or low country of Bengal, it has been supposed that the poison has a paludal origin. The hypothesis, however, of this poison having a paludal origin seems untenable, for the disease it gives rise to does not follow the ordinary laws of paludal diseases, since Cholera Indica has prevailed in districts far remote from every source of marsh effluvia, spreading to countries of entirely different formation, and raging in seasons when paludal diseases cease to exist. It has been said, however, that this is a peculiar poison, generated in marshy countries, and giving rise to a disease which spreads by contagion. Still it will be shown hereafter, that on no point are the profession more agreed than on the non-contagious nature of Cholera Indica, a disease which continues to prevail in India with great violence, and yet has shown no similar tendency to spread.

If we look to the circumstance of Cholera Indica spreading over all countries and at all seasons of the year, the hypothesis of the poison having a telluric origin is much more accordant with the facts.

Thus, if we suppose it to be generated below the crust of the earth, and consequently beyond the influence of the atmosphere, it is easy to understand why its course is entirely independent of the seasons. Again, if we suppose it to have in any degree a central origin, this circumstance will readily explain why the miasmata, percolating with different facilities the different superincumbent strata, may burst forth at distant and remote places, forming new centres or foci of the disease, although the general course of the stream may be uniform. We can readily understand, also, on this hypothesis, why it may affect particular lines of country, as the banks of rivers, the soil lying more loosely and lightly in their neighbourhood.

Some physicians have imagined, from the streams of the poison having sometimes diverged at right angles to each other, or else proceeding east and west, have trended to the north or south, that the poison, if not the electric or magnetic fluid itself, must be extricated by their agency. This may perhaps be the case, but electricity certainly is not the poison itself, for cholera has been observed to rage in every country under very different electrical condition of the atmosphere, and equally when that element has been in a state of equilibrium, and when it has been most disturbed.

The history and habits of this poison, independently of its action on the human frame, are extremely interesting. It is sporadic and epidemic; and its epidemic progress is as follows:—

The progress of epidemic Cholera Indica, in 1817, is extremely remarkable. It originated in Jessore, and the country around that city in August, 1817, whence it spread east and west. The western branch proceeded towards Calcutta, and after devastating that city, continued its course along the Ganges, till it reached the grand army, about 400 miles from Calcutta, and assembled on the banks of the Sinde, in expectation of a war with the Pindarees. Having reached that point, it penetrated southward into the Peninsula of India, in three great streams. The first proceeded from Calcutta along the Coromandel coast, till it reached Madras, while the other two proceeded from the army as from a centre along its lines of communication, till the one reached Madras, the other Bombay—each town in its path becoming infected, and constituting a new focus, whence the disease spread all around. Having reached the two southern presidencies, it continued its rout southward along the Malabar and Coromandel coasts till it reached Ceylon, and from Ceylon it advanced to its extreme southern limit, the Mauritius.

The cholera does not appear to have spread to the westward of India for about three years; but in July, 1821, or shortly after its re-appearance in Bombay, it broke out at Muscat, Busheer, and Bussorah, the three principal ports of the Persian Gulf. From those points two principal streams arose, or one which, proceeding westward, reached the Syrian shore of the Mediterranean in 1823; while the other advanced northward, till it reached Astrakan in Europe, a port on the Black Sea, and situated at the mouth of the Volga. At both these points, however, the disease now died away.

The progress of cholera eastward was as formidable and as remarkable as that westward. From the coast of Coromandel and Ceylon, the cholera, in 1817, crossed the bay of Bengal, broke out on the opposite coast of Arracan in 1818, reached Penang in 1819, and made its way through the Indian Archipelago, devastating Java and the Spice Islands, till it reached Timor, its extreme south-eastern limit. In the Philippine Islands, the malady was marked by one of those terrific outbreaks of barbarian violence which have more than once added to the terrors of this pestilence. The natives accusing the Chinese and Europeans of magic, and of being the authors of the disease, rose upon them, and 15,000 lives are said to have fallen in the struggle. In its progress to the northward it reached Canton in 1820, and Pekin in the following year, and committed great ravages in the populous empire of China. Having thus reached its extreme eastern limit, the stream passed the northern wall, took a retrograde course, passing through Tartary, desolated many parts of Mongolia, and at length reached Orenberg, a Russian city, situated on the Tartar frontier, about 400 miles north of the Caspian sea, in 1829; but whether this stream subsided altogether, or survived till 1831, is not determined.

The progress of cholera did not attract the attention of Europe till the year 1829, when again it established itself in Astrakan, by the revival of the western branch, and by the arrival of the eastern branch. The disease, however, once more died away in that city; but in 1831 it again returned, breaking out for a third time in Astrakan, on the 20th of July. Its re-appearance in this quarter forms a new epoch in the progress and history of cholera, for it now pursued its course throughout Europe, and, in addition to its cold stage, now came armed with a severe and fatal fever, which had not been observed, or but rarely, in India.

The European stream, as it may now be termed, formed two branches, one of less moment, which spread westward into the Cossack country, while the other extended up the Volga till it reached Moscow, in September, 1831. Moscow now became a new centre of infection, from which three more principal branches streamed over this country; one taking a northerly direction reached Archangel, in May, 1831. Another accompanied the Russian troops in their invasion of Poland, while another passed along the route to St. Petersburg, which capital, notwithstanding numerous cordons of troops, it reached in the month of June, 1831. The disease from these two latter points continued to spread westward till Warsaw became affected, and from this city, as from a new centre, it again progressed westward, following the usual law of adhering to the great roads and banks of rivers, till it reached Berlin and Vienna; the former capital being attacked in August, 1831, and the latter in September of the following year, and from these points it gradually spread nearly over the whole of Germany to the east of the Elbe, till among other places it reached Hamburg; and the next new focus after Hamburg, in spite of a rigorous quarantine, was the port of Sunderland, on our own shores; no continental port westward of the Rhine being yet affected. The first case of cholera observed in England, was on the 26th of October, 1831. From Sunderland it spread north and south, and reached Edinburgh, on the 6th of February, 1832, and London on the 26th of the same month, while it infected Dublin about a month later, or on the 22nd of March, 1832. The cholera having now reached the extreme point of western Europe divided into two branches, one of which pursued its course westward till it reached America, while the other retrograded to the south-east, and invaded France, Italy, and the coast of the Mediterranean generally, as far as Malta. It also attacked Spain, Portugal, and the north-western coast of Africa, when the disease, though still prevalent in India, died away. Such is a slight sketch of the progress of cholera, a course in no degree dissimilar to that observed in the progress of the various influenze which have so frequently and so extensively affected the world.

In pursuing its course, the poison of cholera appears to have been developed in two different manners, probably according to the nature of the country, sometimes forming one or more centres, from which the disease radiated in every direction, and again running in lines of no great breadth, the country on either side being healthy. The instances of its acting eccentrically were many, as at its outbreak at Jessore and Calcutta, and also at London and Paris, the country around those capitals being extensively infected. The examples of its acting in lines or belts are also numerous. In the case of the attack on the camp of the Marquis of Hastings, the space of 50 miles, made the difference between exemption from the disease or death. There were also in India many instances of corps marching in parallel lines at small distances from one another, and keeping up the most free communication, and yet in the one the cholera has been raging, while the other has continued healthy. Also, sometimes after running a long course on one side of the Ganges, it would, as if arrested by some unknown agent, at once stop, and, taking a rapid sweep across, lay all waste on the opposite bank. The same fact was also observed in Canada. In other instances, the disease would sometimes take a complete circle round a village, and leaving it untouched, pass on as it were wholly to depart the district. Then after a lapse of a few weeks or even months, it would suddenly return, and scarce re-appearing in the parts which had undergone its previous ravages, would nearly depopulate the spot which had so lately congratulated itself on its escape. Again, in its progress along the Ganges it passed over many large towns and cities, as Banda, Allahabad, and Benares, places which lay in the direct route from Calcutta to the camp of the Marquis of Hastings, and then, like a receding wave, only the more heavily fell on them the following year.

In some fortunate instances the country over which the cholera has thus passed has escaped altogether. Hanover, for example, with the exception of Lunenburg, escaped, as did also the principal towns in Saxony, as Leipsic and Dresden. Weimar, Gotha, Anhalt, Hessia, Brunswick, Mecklenburg, and Bavaria, likewise escaped the disease, as did many countries to the south of Vienna, as Carinthia, Stiermark, and the Tyrol, though surrounded by infected districts.

We have seen that the great streams of cholera on the whole steadily advanced in their course, but they did not proceed at an uniform pace,—the rate of progression varying in different countries. In the year 1817, the cholera had overrun in India, in three months, a space westward of not less than 400 miles, while to the south it had penetrated no farther than Ganjam, only 88 miles from Calcutta, in six months. In the next six months, however, it had extended in a southerly direction over more than four-fifths of the Peninsula. It reached Pekin about the same time it attacked Muscat, the former being twice the distance of the latter. In Europe its progress was equally capricious. It travelled from the Caspian to Vologda and Pskou, within 100 miles of the Baltic, at a rate which would have infected all Europe in three months, while it did not reach Riga, only 180 miles distant from the latter town, till eight months after. Its rate, however, appears to have been most retarded in its retrograde movement; for it took six years after London was infected to reach Rome, and about seven years to travel from Pekin to Astrakan. In a word, it took only one year to span the base of the Peninsula of India, while it occupied 20 years' to compass the globe.

In Europe, and also in India, cholera has prevailed in all seasons, at all periods of the year, and under every degree of heat or cold, of dryness or moisture. It is remarkable, however, that there is in India a period termed the cholera season. In Bengal, for instance, this season usually begins with the heats of March and April, when the cases are few; in May, the disease is generally at its height, and is more or less epidemic, while in June and July it begins to decline, and on the setting in of the cold weather, in October, it so far disappears, that the cholera season is said to be terminated for that year.

Although the cholera has raged in countries of every altitude, has devastated the high table lands of Nepaul, and even attacked the medical depôt at Landorn, situated 8000 feet above the level of the sea, a height which in Europe is almost the region of perpetual snow, yet in general it follows a law common to many other epidemics, or a marked disposition to affect low marshy situations and the banks of rivers, while healthier and more elevated tracts have been more slowly attacked, and more quickly freed from it.

The last remarkable circumstance we shall notice relating to this poison, and which is perfectly inexplicable, and not known to be common to any other morbid poison, is, that in Europe and America the disease has been accompanied by a series of new and terrible symptoms, unknown, or nearly so, in India, a second or febrile stage being added, and which most commonly destroyed the patient after he had successfully struggled through the cold stage, as if the poisons of cholera and of typhus fever had conjoined, forming a new compound which had the deleterious properties of both diseases.

Predisposing Causes.—The deaths from cholera in Paris were estimated at 18,402, and it was remarked that all *ages*, including new-born children, were liable to this disease, but that the mortality was least from 6 years to 20, greater from 30 to 40, and greatest of all in old age. The influence of *sex* in predisposing to cholera can hardly be said to be determined; for in Calcutta, of the native inhabitants attacked with cholera, the males were to the females as four to one, while in Bombay the proportion was as 7 to 25. In Canada the soldiers' wives were observed to suffer nearly in an equal proportion with their husbands; and this was the case among the civil inhabitants of Gibraltar.

In all countries the *lower classes* have always suffered in a much greater proportion than the upper classes. In Calcutta the disease ran a wide career of destruction in the native town, while the "City of Palaces," inhabited by the English, was much less affected in proportion to their numbers, and the same disproportion has been observed, in Bombay. In general also it has been observed among the native inhabitants of India, that the Bramin and Banian merchant suffered less than the Ryot or farmer, while the poor outcast Pariah suffered the most of all. In every town in Europe also it has been observed that the lower classes, and especially those resident on the banks of rivers, have suffered infinitely more than the upper classes.

In military life it has been supposed that the Sepoy suffered more than the European soldier living in India. This perhaps is true in some instances; but the returns of the Madras army show this not to have been the fact in that Presidency; for the European soldiers attacked appear to have been as one to three, while of the Sepoy force it was only one in four and a half. In the Indian army also it appears to have been universally observed, that the officer suffered in a less proportion than the soldier, the cavalry than the infantry, and the infantry less than the hard-labouring ill-fed camp-follower. The troops on march likewise universally suffered more than the troops in quarters.

The effects of a poor diet will perhaps be better understood, by stating that the European suffers less than the Mohammedan, and the Mohammedan, who is better fed and better clothed than the Hindoo, except during their rigid fasts, when the Mohammedans suffered in a much larger ratio.

Susceptibility exhausted.—The actual number of persons attacked out of any given population appears to have varied very greatly. Mr. Scott has stated, that in the marching corps it has varied from 17 to 330 per corps of about 1000 men; and in no instance, even in all the wretchedness of the Indian towns, has the community suffered to the whole extent of the population. In Europe, Moreau de Ionnès has given the following estimate as an approximation to the probable numbers attacked in this part of the world: In France, 1 in 300; Russia, 1 in 20; Austria, 1 in 30; Poland, 1 in 32; Prussia, 1 in 100; Belgium 1 in 120; Great Britain and Ireland, 1 in 131; Holland, 1 in 144; Germany, 1 in 700. The circumstance of one attack by no means armed the constitution against a second in the same or any subsequent year; still a repetition of the disease in the same party in the same year was rare.

Co-exists.—The poison of cholera is capable of co-existing with many other poisons. Several patients were attacked while labouring under syphilis. One man labouring under small-pox was attacked, when the pustules immediately shrivelled and dried up. Typhus fever and cholera ran constantly into each other, and sometimes cholera terminated in intermittent. No disease has yet been remarked as giving an exemption to cholera.

Modes of Absorption.—We possess no data to enable us to determine by what tissue the poison is absorbed; but it is probably the mucous tissue, and infects the blood; for that fluid is found greatly altered, certainly in its constituent parts, if not in its chemical qualities.

Period of Latency.—The period of latency probably varies considerably, and in some instances it is extremely short. The King's 41st regiment arrived in two divisions from England at Madras, and within three days of their arrival the cholera was raging among them. The minimum of time is undetermined; but troops leaving their barracks perfectly healthy have been attacked after a few hours' march. Again, a vessel sailing from an Indian port has reached the line before the disease has broken out,—a voyage seldom performed in less than a fortnight.

Pathology.—The theory of this disease is, that a poison has been absorbed and infects the blood, and that after a given period it produces disordered action of the muscles or parts supplied by the spinal cord, also of the lungs or parts supplied by the eighth pair, and likewise of the alimentary canal generally, or parts supplied by the great sympathetic. Again, if the disease passes into the second stage, it produces in addition fever and inflammation of the membranes of the brain.

The depressing influence of this poison is so great that life has frequently been destroyed in a few moments, and not unfrequently in two or three hours. It will be plain, then, that a poison so powerful, so suddenly overwhelming all Nature's efforts at resistance, does not allow time in many cases for any secondary or specific actions to be set up. In those patients, therefore, who have fallen in the first stage, or within 48 hours of the attack, rarely has there been found any alteration of structure in any organ or tissue, unless the disease has been preceded by long-continued diarrhœa, in which case the follicular structure of the intestinal canal has been found to be enlarged, and the intestine filled more or less with a turbid, inodorous, semi-diaphanous fluid, usually compared to a thin starch or rice-water, the remains of that immense secretion which has taken place during life, and which, being tested, has been found sometimes acid and sometimes alkaline. A layer of greyish mucus has also been found coating the whole of the mucous membrane of the alimentary canal, but without a trace of bile, although the gall-bladder is usually filled with that fluid. If the first stage has been prolonged the mucous membrane of the alimentary canal is of a livid colour, and in some instances has presented a mammillated appearance, probably caused by an enlargement of the follicles; for, according to Dr. Budd, by drawing the coats of the stomach between the finger and the thumb, and using some pressure, a white opaque fluid is squeezed out, and the mammillated appearance effaced.

The liver, the spleen, and the kidneys, have in general been found gorged with blood, and this engorgement extends even to the bones, which, Louis says, appear as if the animal had been fed on madder. The bladder is contracted and empty. The membranes of the brain and cord are in general congested, and the substance of the brain dotted with more puncta cruenta than usual.

Such are the appearances which the body has presented, when the patient has fallen in the first, or asphyxiated, or pulseless stage; and the phenomena are said to differ in no respect from those observed in persons who have died in the first stage of intermittent fever, when the blood, driven from the periphery, accumulates in the centrical parts of the body. The enlargement of the follicles is supposed to be peculiar to those cases in which diarrhœa, or other disorder of the alimentary canal, had for some time preceded the fatal attack.

When the patient has survived until re-action has taken place, and the second or febrile stage has been formed, the body no longer presents that shrunk, worn, and livid appearance it did on death taking place in the first stage; but on the contrary, rather the fulness and plumpness of the fever patient. The injection of all the large organs has also disappeared, the blood being recalled to the surface of the body. The alimentary canal is no longer distended with the turbid secretion peculiar to cholera, but contains a thin yellowish *purée* of fæcal matter, having the usual odour. The mucous membrane of the alimentary canal has now, however, been found more or less diffusely inflamed, sometimes in all its divisions, but more especially of the pyloric portion of the stomach, and also of the duodenum. The Plaques du Peyer as well as Brunner's glands, though occasionally found enlarged, were seldom found ulcerated; but when that was the case the corresponding mesenteric glands were also enlarged, being sometimes pale or purple, and when cut into gave issue to a dark liquid blood.

The lungs have often been seen congested, and in the first stage of pneumonia, while the brain has presented the ordinary appearances of fever, or more puncta cruenta than usual, the membranes being often congested or inflamed, with the usual serous effusion into the arachnoid cavity.

Symptoms.—Cholera Indica has no varieties but many degrees, and hence many pathologists have divided it into Cholera Indica mitior, and into Cholera Indica gravior. The French have termed the slighter forms of the disease Cholerine.

The Cholera Indica is divided into two stages, or into the cold, pulseless, or asphyxiated stage, and into the hot or febrile stage. This latter stage, however, is not essential to the disease, and has been observed in India in a small proportion of the cases only. In Europe, however, the febrile paroxysm has followed in the majority of instances. The duration of the cold stage varies from a few minutes to 12, 24, 48, or even more hours, while the hot stage lasts from four to eight or more days, making the total duration to vary from a few minutes or a few hours to two, three, or even four weeks.

The attack of this fatal epidemic is most commonly sudden, the patient at the time of his sickness being apparently in his best health; yet not unfrequently slight diarrhœa or other general indisposition has preceded it. In India in some cases the premonitory symptoms are vertigo, noise in the ears—the latter sometimes so loud as to have been compared to the humming of a thousand swarms of bees, to the beating of all the drums in the camp, or to the roaring of the surf on the Coromandel coast.

The disease being formed, the suddenness with which the poison sometimes extinguishes life is extremely remarkable. When the cholera reached Muscat, instances are given in which only ten minutes elapsed from the first seizure before life was extinct. In one instance a Jew merchant was closing a bargain, when he suddenly vomited twice, fell down, and expired. Many natives at Hoobly were attacked while walking in the open air, and having retched, complained of vertigo, blindness, or deafness, fell down, and expired in a few minutes. At Punderpore also the disease is said to have been fatal in an equally short time, so much so that 350 persons are reported to have died in the streets, "tumbling over each other lifeless," or, according to another authority, "as if knocked down dead by lightning." Instances of death taking place in two, three, four, or more hours are extremely common. The more usual course of the disease, when limited to the cold stage, is as follows:—

After the patient has been troubled for a few days with diarrhœa, but more commonly while he is yet in perfect health, and has retired to rest, and has slept soundly till the middle of the night, or far onwards till morning, he is suddenly seized with a most unaccountable sickness and vomiting, together with a most profuse discharge from the bowels. These evacuations are attended with most severe pains down the thighs, and more especially by an indescribable and subduing sense of exhaustion, the patient often fainting in the water-closet. In an instant not only are the physical powers of the body exhausted, but its temperature sinks rapidly below the natural standard, and an icy coldness benumbs it; while the skin is sometimes rendered so insensible, has so lost its vitality, as to resist even the action of boiling water or other powerful chemical agent. The breath also, as it issues from the mouth, has a glacial feel. Still, notwithstanding this great loss of temperature, the patient complains of being oppressed with heat, is incessantly throwing off the bed-clothes, and cold water is grateful to him, copiously and eagerly drank, yet affording no relief to his insatiable thirst.

The extreme coldness of the first stage is further accompanied by a blue, livid, or purple discoloration of the hands and feet, extending not only a considerable way up the arms and legs, but sometimes over a great part of the body. These parts often also become, in a few minutes after the seizure, not merely shrunk, but singularly wrinkled, like the hands of a washerwoman after a day's hard labour. These frightful symptoms are rendered still more distressing by the shrieks and groans of the poor sufferer, often tortured by horrible spasms, which affect the fingers, the toes, the arms, or the legs,—spasms which clench the jaw, fix the walls of the abdomen in contact with the spine, or draw the trunk into singularly contorted forms. The patient thinks he obtains some relief from friction, and his cries are incessant to his attendants to "rub hard."

As the disease proceeds the countenance assumes a character peculiar to this great struggle, or the facies choleritica, the eye being deeply sunk, red, and injected; while the aqueous humour transuding its coats leaves the cornea flat and depressed as in the dead body; a broad and livid band also encircles the lower portion of the orbit; every feature, moreover, is sharp and pinched, as after a long disease; the complexion thick and muddy; the lips and tongue purple; and all these great changes have been known to take place in a few minutes.

In addition to this sad state, the vomiting is constant, the purging most incessant, and the pulse, though generally natural, sometimes rapid, yet in some cases is not to be felt, even from the first moment of the attack, either in the large superficial arteries or at the wrist. The voice also is strangely altered, its firm and manly tone has changed to a low, feeble, unnatural, and almost sepulchral sound. The urinary secretion is likewise entirely suppressed, while no bile flows into the intestines. The only organ which seems to preserve its powers is the brain; and the patient often to the last moment of his life retains the power of thinking and of expressing his thoughts distinctly, sometimes full of hope, while at others he seems indifferent to the fate which too often inevitably awaits him.

On the accession of the spasms, of the vomiting, and of the purging, the disorder is fully developed, and the crisis is at hand which in a few hours must decide the fate of the patient. The termination may be favourable or unfavourable; if unfavourable he may die with all the symptoms narrated strongly marked, or should it be favourable they may abate, and a happier prognosis be formed. Unfortunately, however, it too often happens that, although the stomach retains what is taken, and the purging appears checked, and the patient falls into a dose, yet the weakness, the entire cessation of the pulse, the coldness and lividity of the surface, and the ghastly expression of the countenance, show that a few hours must close the scene. This melancholy result occurred to Gendrin in 17 out of 20 cases, and often with so little struggle that death was only marked by the phenomenon of cadaveric contraction.

But, strange to say, death does not always terminate the singular phenomenon of the cold stage of this extraordinary disease; for in many instances after the functions of the brain have ceased, and life is apparently departed, the hand has been seen to move, the toes to bend, the jaw to become clenched, the leg to rotate, and the muscles of the thigh to quiver; and in India instances have been seen of the dead body having been drawn into an upright sitting posture, and even to make a round turn on the table on which it has been laid out. These phenomena often last for some hours, and show that the cord continues to supply a nervous power long after the brain is dead.

If the patient should happily survive the cold stage, the disease may terminate by a rapid recovery, or else may pass into the second or febrile stage. The former is the more usual course in India, the latter in Europe. The first symptom of returning health is the patient falling into a sleep of unusual soundness, during which the respiration becomes light and easy, the pulse freer, while a gentle warm perspiration bedews the whole body. This grateful pause in the disease appears to be the result of the returning powers of life, almost uninfluenced by medicine, for it often occurs where none has been given. After this balmy slumber the patient awakes refreshed, and often recovers so rapidly, that in the natives of India it almost resembles a restoration after syncope. In all the presidencies, indeed, and especially in Bengal, the recovery of the European has in general been followed by a stage of re-action, usually slight, but in some cases assuming the form of the bilious remittent or country fever, and which has occasionally terminated fatally.

In Europe, restoration after the cold stage and without febrile re-action, is by no means so frequent or so rapid as in India. Sometimes the re-action is trifling, and sleep may indeed have ensued, fæcal evacuations containing bile may have passed, the urine may again have flowed, the purging, vomiting, and spasms may have subsided, the pulse may have risen, the blueness may have disappeared, and the temperature of the body may have increased, yet in many instances this amelioration of the symptoms was only temporary, and the patients relapsed and died.

In 13 cases out of 20, however, the re-action was more considerable, and the patient, in a few hours after the subsidence of the cold stage, laboured under a severe form of fever in no degree dissimilar to, and not less fatal than, typhus. For the first few hours after the febrile re-action the tongue was white, but quickly became brown and dry, while a black sordes incrusted the teeth and lips. The eye now was deeply injected and red, the cheek pale or flushed, the pulse rapid, and the temperature of the body a little above or below the natural standard; and the patient, either delirious or comatose, lay in a state resembling the last stage of the severest continued fever of this country. This struggle usually lasted from four to eight days, when the symptoms either gradually yielded or death ensued. In a few mild cases the fever assumed an intermittent type, or sometimes a quotidian, sometimes a tertian form; all these cases usually recovered. Such is a general outline of the symptoms of this formidable disease.

The blood in cholera varies according to the stage, and that taken in the cold stage is usually of an unnaturally dark colour and thick consistency, so that it flows with difficulty from the veins, and very imperfectly separates into clot and serum. Blood also taken from the temporal artery has been found equally black and thick. Chemical analysis has shown this singular state of the blood to be partly owing to a deficiency in the quantity of serum in proportion to the clot, to a deficiency of fibrine, and to some diminution in the quantity of the usual salts. In those cases in which the urine is suppressed, urea has been detected both in the blood and in the bile. After the fever is formed the quantity of serum increases, till at length it is much more abundant in the blood than natural; and it is singular this takes place, notwithstanding the secretion of urine is re-established.

Diagnosis.—The phenomena of the first stage of Cholera Indica are so unlike those of any other disease that they cannot be mistaken. The second or febrile stage is similar to many of the forms of typhus fever, and is not to be distinguished from them, except by the previous history. The Cholera Indica differs from the cholera morbus of Sydenham in the lividity of the extremities, the suppression of urine, the nature of the evacuations, in the loss of the pulse, and in the greater amount of collapse.

The Cholera Indica, as seen in India, differs also from that of Europe, according to Drs. Barry and Russell, in the evacuations of the former being more profuse and ungovernable, and again from the patient being much more frequently convalescent, without passing through the febrile stage.

Prognosis.—The mortality from cholera in all countries is very great. Taking the whole number attacked, it is said that the number of deaths in Astrakan were as one to three; in that of Mishni Novogorod as one to two; in Moscow and Casan as three to five; and in Penza, in the country of the Don Cossacks, as two to three. In the summer of 1831 the mortality at Riga, St. Petersburg, Mittau, Limburg, and Brody, according to the Berlin Gazette, was about one-half, while at Dantzig, Elbing, and Posen, it was about two-thirds of the whole number attacked. The period of the season, however, greatly influenced the mortality; for, on the first onset, nine-tenths of all those attacked perished, then seven-eighths; and the proportion of deaths forms a gradually decreasing series of five-sixths, three-fourths, one-half, one-third, till towards the close of the season a large proportion of those attacked recovered. The uniformity of this law in every country affected with cholera, whether Europe, America, India, or China, is extremely remarkable.

The chances of recovery are much diminished in young children and in the aged; the age of greatest number of recoveries being from 15 to 20. The feeble in constitution, the sick and the convalescent, were in all cases the surest victims of cholera. But whatever the age of the party, Gendrin states he lost every case which became pulseless.

Treatment.—There are few diseases for the cure of which so many different remedies and modes of treatment have been employed as in cholera, and unfortunately without our discovering the antidote to this poison. In Moscow, it is said 20 different modes of treatment were practised at different hospitals, and that the proportionate number of deaths was the same in all. In the same city also, it is supposed that the mortality was not greater among those destitute of medical aid than among those who had every care and attention shown them. It may be fairly inferred, therefore, that in the severer forms of the disease, the action of this poison is so potent, as to render the constitution insensible to the influence of our most powerful remedial agents. When, however, the disease is mild, or on the decline, much may be done by obviating symptoms to promote the recovery of the patient.

The heroic remedies that have been employed in cholera, are bleeding, calomel, and opium, either separately or conjointly. With respect to bleeding, it may be stated, that in every country the patients bore bleeding badly in any stage, and that the practice in Europe was at length limited to a few leeches occasionally to the head. As to calomel that medicine was used to the greater part of an ounce in the 24 hours, but with so little success as an antidote, that many patients have been seized and died under the full influence of mercury. On the appearance of cholera in Europe, opium was administered in the doses recommended by the Indian practitioners, or to the greater part even of an ounce of laudanum, but it was soon seen that, in the cold stage, it was inefficient in controlling the vomiting or purging; that it did not allay the spasms, and, moreover, hardly produced any narcotic effect. The action of the accumulated doses of opium, however, though suspended during the cold stage, was often fully developed in the hot stage, and occasioned so much affection of the head, that most practitioners either abandoned its use, or else limited it to a mere fractional dose of that exhibited in India, or to ♏iij. to ♏ xij. of tinct. of opii, or to gr. ſs. to gr. j. 6$^{\text{tis}}$ vel 4$^{\text{tis}}$ of solid opium.

Another heroic plan, peculiar perhaps to this country, and which was practised when the inefficiency of medicines was generally admitted, was an injection of a solution of ʒ ſs. of muriate of soda, and of ℈ iv. of sesquicarbonate of soda, in ten pints of water, of a temperature varying from 105° to 120° Fahrenheit, into the veins of the suffering patient. This solution was injected slowly, half an hour being spent in the gradual introduction of the 10 pints, and the immediate effects of this treatment were very striking. After the introduction of a few ounces, the pulse which had ceased to be felt at the wrist became perceptible, and the heat of the body returned. By the time three or four pints had been injected, the pulse was good, the cramps had ceased, the body that could not be heated had become warm, and instead of a cold exudation on the surface, there was a general moisture; the voice, before hoarse and almost extinct, was now natural; the hollowness of the eye, the shrunken state of the features, the leaden hue of the face and body had disappeared, the expression had become animated, the mind cheerful, the restlessness and uneasy feelings had vanished, the vertigo and noises of the ear, the sense of oppression at the precordia had given way to comfortable feelings; the thirst, however urgent before the operation, was assuaged, and the secretion of urine restored, though by no means constantly so. But these promising appearances were not lasting; the vomiting continued, the evacuations became even more profuse, and the patient soon relapsed into his former state, from which he might again be roused by a repetition of the injection; but the amendment was transient, and the fatal period not long deferred. Of 125 patients thus treated at Drummond Street Hospital, under the direction of Dr. Mackintosh, only 25 recovered,—a lamentably small proportion.

The great want of success that has attended these heroic methods, has caused every substance at any time known in the pharmacopœia to be tried as an antidote. Every metal, from arsenic to platina, was exhibited; also every vegetable and mineral acid; the various alkalies, and most of the neutral salts; phosphorus; strychnine and quina; hæmatoxylum, kino, and every known vegetable astringent; hydrocyanic acid; the entire class of narcotics; the large class of essential oils, balsams, turpentines and spices, and most tonic medicines; and when these failed, the patient has been made to respire oxygen or nitrous oxyde gas; and with a view of imparting new powers to the sinking frame, transfusion of blood has not unfrequently been performed; but all these means have been equally unsuccessful.

The failure of all these powerful means at length caused most practitioners to confine themselves to checking the diarrhœa which so frequently precedes cholera, and lays the foundation of the future attack, and subsequently to obviating symptoms. For this purpose moderate doses of opium or morphine, either alone or combined with stimulants, as the confectio opiata, or the pulvis cretæ compositus cum opio, were often sufficient. In more obstinate cases some vegetable astringent was added, as the tinct. of kino, or the decoctum hæmatoxyli, and these remedies frequently prevented the attack altogether. If, however, the disease proceeded, and the cold stage of cholera formed, the same remedies were prescribed, moderate in quantity, and often out of an effervescing draught. Heat was also now applied, and the patient wrapped up in warm blankets and hot bottles, or bags of heated sand placed around his cold and benumbed body. The warm bath was at first tried, but discontinued from the uncontrollable nature of the vomiting and purging, and the oppressive heat it produced to the patient's feelings. Mr. Dalton's vapour-bath was next used, but without benefit, and to the disappointment of the hopes which had been entertained of it. Other methods of restoring warmth were also had recourse to, as frictions with the hand, or by flesh-brush, or rubbing the body with some stimulant embrocation, compounded of garlic, capsicum, camphor, cantharides, or other powerful irritant. Mustard poultices also were often applied to the feet and abdomen, blisters with or without an addition of oil of turpentine, the part having been previously rubbed with hot sand; and in more urgent cases, the mineral acids, and even boiling water were employed for the purpose of producing instant vesication. And again, other practitioners tried to stimulate the waning powers of life by galvanism, acupunctuation of the heart, issues, setons, moxas, actual cautery along the spine, and lastly, by small pieces of linen dipped in alcohol, and distributed over the body, and then set fire to.

In a few instances these efforts were rewarded with success, re-action and the second or febrile stage formed. It was at this period that some physicians thought that calomel should be exhibited in moderate doses, for the purpose of producing a flow of bile into the intestines, and of emulging the gall-bladder and ducts, as well as of restoring the other suppressed secretions. The indications, however, more generally followed, were to treat the case as we should a similar state of typhus, namely, to moderate the affections of the bowels by mild opiates, by enemata, and by sinapisms to the abdomen; also to relieve the head by leeches and cold lotions, and subsequently, as the tongue became brown, to support the patient with wine, sago, strong broths, and a generally cordial treatment.

Dietetic and Preventative Treatment.—It is plain, from the severe derangement of the alimentary canal, that mucilaginous drinks and light broths, either alone or combined with brandy, will be proper in the first stage of the disease. In general these drinks were given warm, but the patient had often a craving for iced cold drinks, and no inconvenience has resulted even when he has drank freely of them. In the second stage, the diet was a milk diet, with strong broths, but wine was seldom beneficial, or only so in very small quantities.

The preventative rules were to avoid everything that could occasion indigestion; for in every country there were numerous instances of cholera having immediately followed eating ascescent fruits, or uncooked vegetables. In Calcutta, eating shell or the table fish caught in the Ganges has often led to the same consequences. Acts of intemperance or debauchery were equally fatal. In India it is an axiom to avoid the great heats of the day, and also the damps of the night air. Again, on a march to avoid, as far as possible, encamping in infected districts, or on the banks of rivers. The greater question, however, which a consideration of the preventive treatment involves, is, whether cholera is or is not contagious, and consequently whether any precaution is necessary in our intercourse with the sick.

The great argument, which is urged in favour of the contagious nature of cholera, is that, originating in India, it has spread east and west, extending along the high roads and banks of rivers, from city to city; and also that in a very few instances the medical and other attendants have suffered in a larger proportion than the community generally, and consequently it is inferred that the disease is propagated by miasmata generated by the patient's person. On the contrary, it is contended that cholera is not contagious, because that disease still rages in India with its fullest force, and yet does not spread, although the communications with that country are far more frequent and rapid than at any former period. Again, that the progress of cholera has been in no degree dissimilar to that of other epidemic diseases not generally considered contagious.

And lastly, that the instances of medical officers and other attendants on the sick not suffering in a greater proportion than the rest of the population, are numerous, and far outweigh the few cases which can be adduced to the contrary. It will only be necessary to add a few examples of the immunity of the attendants generally on the sick to place this argument in its proper light.

Mr. Jameson states, that in Bengal the general voice of the inhabitants at large is uniform against the disease being contagious or conveyed from person to person. He adds also, of 250 officers, comprising the medical staff in Bengal, all but one are non-contagionists; and that out of the whole list only three of these gentlemen were known to have been attacked with cholera during the three years it most severely raged, or from 1817 to 1820. On the Bombay side also the reports equally corroborate the general exemption of the medical officers and attendants on the sick. Thus Dr. Taylor affirms, of 44 assistants employed under him only three were seized with cholera.

It has been thought that the disease, though not contagious in India, where the Hindoo lives " sub dio," and is, from his religion, cleanly to excess, might still be contagious in Europe, where it acquired a new property of a febrile stage, and where the habits of the people are less cleanly, and indeed entirely different, from those of the natives of India. But the evidence of the non-contagious nature of cholera is as positive in Europe as in India.

Drs. Russell and Barry, in their communications with the British government, state, that 25 physicians at St. Petersburg held a consultation whether the cholera was or was not contagious, when 21 declared it to be non-contagious. Chambert, of the Warsaw commission, states, that of 100 physicians, English and German, about the sick in Warsaw, none suffered from cholera.

The number of practitioners in Paris is estimated at 1800, yet not more than 25 to 30 laboured under this disease, and of these not more than 15 or 16 died. Again, the wards of the Hôtel Dieu, assigned for the reception of the cholera patients, were filled, still no case was proved to have occurred from infection among the 12 physicians, the 100 pupils, or the many hundreds of medical men that came from all quarters to see the disease. The nuns and the nurses escaped also with an inconsiderable mortality. In England, in Gibraltar, and in the Canadas, the experience of the profession was to the same effect; and if we add to this, that many hundred bodies were dissected, that some physicians inoculated themselves with the blood drawn from the cholera patient, and also tasted the matter vomited; have lain also in the wards of the cholera hospitals for nights together, rubbed, been in the closest contact with the sick, and yet have not fallen in any greater proportion than the population generally—the conclusion seems forced that cholera is an *epidemic*, and not a contagious disease.

Of the Poison of Influenza.

Influenza is a catarrhal affection, generally accompanied by fever and cough, sometimes with sore throat, and often going off with an affection of the bowels.

This class of affections was known to Hippocrates, and is mentioned in his aphorisms, his prognostics, as well as in other parts of his works; but this physician, as well as the ancients generally, considered it as having merely a local origin, as being endemic in different towns and districts of Greece or Italy, and as being caused by the vicissitudes of the weather. Towards the close of the XIIth and XIIIth centuries, however, it was observed that catarrh was not only endemic in particular districts, but that it occasionally spread over large portions of country, while still later, or in the year 1557, it was found to prevail epidemically, not only over the whole of Europe, but even over the whole of the northern hemisphere, beginning in Asia and proceeding westward till it terminated in America. In the XVIIIth century a new law of its progression was observed, as that having advanced westward till it reached the Elbe, it passed over the intermediate countries and reached England, where the stream broke into two branches: the one crossing the Atlantic to America, while the other retrograded south-east through France, Spain, and Italy, till it was lost in the Mediterranean,—a course similar to that described by cholera.

Remote Cause.—The influenza has occasionally originated as far eastward as India, but more commonly it has broken out in the north of Europe, as Moscow, Warsaw, or Dresden; and consequently there must be many primary foci or centres of this poison. It seems probable that, like the poison of Cholera Indica, its spread may be limited to a small number of these primary foci; for we find, in every volume of the Calcutta Transactions, accounts of some catarrhal fever spreading for a season along the banks of some principal river, and then subsiding; so that it is evidently only occasionally and at long intervals *erratic*, as in 1729, 1743, 1775, 1782, 1831, 1833, and 1837. The influenza, therefore, is both endemic and epidemic; and, in the latter case, we find it, at least in Europe, spreading from east to west, prevailing in the depths of winter as well as the heights of summer, lasting nearly the same space of time in the different towns and cities it attacks, or from four to six weeks, affecting contiguous places in different degrees and at different times—circumstances so remarkable, that it seems impossible to explain them, except by supposing the existence of a poison generated beneath the crust of the earth, and beyond the reach of atmospheric influences: an hypothesis which assimilates its origin to that of Cholera Indica.

On looking to the habits of this poison it is probable that its actions are not limited to men; for in most years, when influenza has been epidemic, a similar disease has been epizootic.

Predisposing Causes.—The attack of influenza is for the most part so universal that large portions of the population of every country in which it has prevailed, without respect to age, sex, or condition, have been commonly infected. In general, however, women, from being less exposed to the weather, have suffered in a smaller proportion than men, and children less than either. In all of these epidemics the aged, however, suffer greatly. The calculation of Dr. Heberden for the year 1837 is—of persons between 30 and 40, 412 died; of persons between 50 and 60, 500 died; while of persons between 70 and 80, 563 died, an enormously increasing ratio. In the same year also the mortality at Salpetrière, where the inhabitants are chiefly the aged poor, was increased one-third over former seasons.

It has been remarked, in the several influenze, that the low parts of the towns have been more generally and more severely affected than the higher and more healthy districts.

Susceptibility exhausted.—Few persons suffer more than one attack of influenza in the same season, although many relapse; but one attack of this poison in no degree protects the constitution from a second in another season.

Co-exists.—The influenza has often co-existed with measles, scarlatina, syphilis, and probably with every other disease produced by any other morbid poison.

Modes of Absorption.—This poison probably follows the laws of most other morbid poisons, and is absorbed by the mucous tissues, and infects the blood. The argument for the latter assumption is, that influenza has been greatly fatal to pregnant women. Majendie, speaking of this law, says, "I *believe* it, although I dare not affirm it."

Period of Latency.—It is extremely difficult to determine the period of latency of an epidemic disease. If, however, we suppose the poison to have a land origin, there are instances of persons being seized within 24 hours after their landing from a voyage from a foreign country. In other cases, however, the period has appeared to vary from 10 to 20 days.

Pathology.—The theory of this disease is, that a poison is absorbed and infects the blood, when, after a given period of latency, it produces disordered functions of the great nervous centres, causing great general depression, together with slight or severe remittent fever. The specific actions of this poison are on the mucous membrane of the eyes, of the nose, and of the bronchi, causing common catarrh. In a smaller number of cases, on the mucous membrane of the fauces, causing sore throat, and in a still smaller ratio on the substance of the lungs and on the pleura, causing inflammation of those organs. In most instances the disorder terminates in diarrhœa by an ultimate action of the poison on the mucous membrane of the intestinal canal. These different pathological phenomena vary in frequency and complexity in different seasons.

In most cases, when the poison is of sufficient intensity to produce fever, the type is remittent, with exacerbations in the evening. Its usual duration is two, three, or four days, when it terminates in an abundant sweat, and which not unfrequently leaves great debility behind it.

At the same time, however, with the fever, or else preceding or succeeding it, the patient has in general been seized with a slight inflammation of the ocular and nasal membranes, followed by coryza, or the serous discharge of a common cold or catarrh; and this inflammation generally affects the larynx and trachea, while either are attacked by sore throat or pneumonia.

The proportionate numbers of those attacked with pneumonia cannot perhaps be determined, for the hospitals admit only the worst cases. Thus, out of 125 male patients suffering from influenza, and admitted into the Hôtel Dieu, between the 15th January and 1st March 1837, 33 laboured under pneumonia—an enormous proportion. The women appeared to suffer in a less proportion from this inflammation, for out of 58 female patients 7 only had pneumonia.

The pneumonia occupied most commonly the middle and lower lobes, and only rarely the summits of the lungs: out of 40 cases observed by M. Landan the inflammation occupied 21 times both lungs, 11 times the right lung, and 8 times the left. The forms of pneumonia are principally serous inflammation and red hepatization, the latter occasionally interspersed with a few points of pus. Majendie, in demonstrating the nature of "la grippe" to his pupils was enabled to show them specimens of both those states.

The bronchial membrane, when examined, was in general found red, and covered with the secretions usual in bronchitis. The appearance of the sore throat was that of a broad dusky-red band extending over the fauces, uvula, and tonsils. The uvula was elongated; but the tonsils were rarely swollen, and still less frequently ulcerated.

Symptoms.—The symptoms of influenza often form themselves into different groups, giving rise to many varieties. Thus the catarrh often existed without the fever, and, in a smaller number of cases, the fever without the catarrh. The angina was frequently the most prominent symptom, while in other instances the bronchial affection alone harassed the patient.

Whichever of the forms prevailed the disease usually began with shivering, general soreness, headache, and pains in the limbs; and these symptoms were frequently accompanied by fever, slightly increased towards evening. The patients were usually seen about the third or fourth day, and they now complained of cough, tightness of the chest, of pain in the epigastrium, and also of dyspnœa. The face was likewise flushed, the alæ of the nose red, the lip vesiculated, the eyes streaming with coryza, and the voice altered as in a common cold. The tongue was moist, or coated with a yellow mucus, the skin open and without morbid heat, the pulse little augmented in frequency. But notwithstanding each of the particular symptoms were mild, there was a languor, debility, and dejection of spirits far beyond what might have been expected, and almost exceeding that of common fever, and which was in many instances long in subsiding.

In mild cases these symptoms constituted the whole disease, and the patients recovered about the eighth or tenth day, after suffering for a few hours from sharp diarrhœa. In many instances, however, the patient, in addition, suffered from mild or severe sore throat, or a cough came on and continued for many weeks. In a few cases the symptoms were of a more aggravated character, the fever being more marked, the pulse accelerated, the skin hotter, and the cough more troublesome; and this has often been followed by inflammation of the lungs.

Inflammation of the substance of the lungs seldom occurred till the second or third day, and more commonly not till the fifth or sixth day; and although generally, was not always preceded by shivering, or even by bronchitis. The pneumonia in some years has been characterized by well-marked symptoms, as pain in the side, dyspnœa, and by purulent or sanguineous expectoration, so that nobody could mistake it; but in general the pneumonia has been adynamic in character, and presented a striking contrast to the usual symptoms, there being scarcely any local pain, the pulse, ordinarily so large and full, has been slow and small, and though sometimes counted between 80 and 90, has ranged more commonly from 60 to 70. The face also, instead of being full and red, has been sharp and pale, the lips blue, and the extremities cold. The patients also, who generally preserve a good deal of power in the ordinary forms of pneumonia, were now so weak that they were obliged to be supported while auscultated; and even this mode of exploring the chest did not afford the usual indications, for crepitation was rare, and the respiratory murmur heard, except in a few points, all over the chest, while there was little or no bronchophony. The expectoration likewise had not the characters observed in simple pneumonia, for instead of being purulent and mixed with blood, it was thin, transparent, and viscid, and, if fever accompanied it, it was usually of an adynamic character, marked by a brown tongue, an accelerated pulse, and occasionally by delirium.

The appearances of the sore throat have been already mentioned, and its character was generally asthenic, and only in a few instances of a sthenic character.

Diagnosis.—It is extremely difficult to say in what influenza differs from a common cold, either in its symptoms or in its consequences. It seems probable, however, that they both depend on the action of the same poison, varying perhaps in intensity and general diffusion. In the year 1783 it was conceived that the debility which always accompanies the influenza, and the rapid manner in which it was formed, give the most obvious distinctions, and perhaps no better diagnosis can be found.

Prognosis.—Children and persons under 40 died in a very small proportion, unless in a previous state of ill-health. The mortality, however, among the aged has in every country been great from this disease. It has been remarked, also, that the disease, if not fatal in itself, left the patient, of whatever age, often greatly debilitated in body and depressed in spirits, and that those with tender lungs frequently fell into phthisis, or continued to cough for several months afterwards, so that a complete recovery was often long and tedious.

Treatment.—As a general rule the great majority of cases in these epidemics have scarcely required any medical treatment. In that of 1782 it was observed that "many indeed were so slightly indisposed as to require little or no medicine; nothing more was wanted to their cure than to abstain for two or three days from animal food and fermented liquors, and to use some soft diluted tepid drink. A lenient purgative at the beginning of the disease was useful in moderating the fever, and nature seemed to point out the repetition of it afterwards when there was pain in the stomach and bowels and a tendency to diarrhœa. The same was observed in 1762. Nothing likewise was observed so successfully to mitigate the cough as to open the bowels with a gentle purge, and afterwards to give a gentle opiate at night.* In the year 1837 it was also remarked, as long as the symptoms were limited to cough, hoarseness, headache, or other pains moderate in degree, that the patients all recovered by putting them on a low diet, by attending to their bowels, and confining them for a few days to the house; and if more was attempted it was quickly found that the disease ran a course scarcely influenced by medicine. A smaller number, however, required medical attendance, either from the severity of the bronchitis, the occurrence of pneumonia, of angina, of the disordered state of the bowels, or more often from the debility induced by the disorder.

In general when the bronchitis was severe, but the substance of the lung as yet unaffected, leeches to the chest, or cupping, or moderate bleeding were borne extremely well, and the patient relieved; while in the aged, blisters to the chest, followed by a series of linseed poultices, were often of essential service; and this treatment, together with neutral salts, opiates, and diaphoretics, in general effected the cure. In all the great influenze, however, it has been remarked that the whole class of expectorants were either useless or uncertain in their action.

In pneumonia it has been found, that although a few persons bore the loss of a considerable amount of blood, yet in general that blood taken beyond a very limited quantity, as 12 to 16 ounces, either did not relieve the complaint, or was actually prejudicial. It is in this form of pneumonia that large doses of the antimonium potassio tartarizatum have been found so advantageous. Indeed it seems distinctly proved that this form of pneumonia will not bear that powerful antiphlogistic treatment which is necessary when it arises from general causes and is of a more sthenic character.

When the patient was affected with angina, it yielded readily to the usual law of treatment of that affection, or to small bleedings when the tonsils were swollen, and to small quantities of wine when the tonsils presented little or no increase of size. The derangement of the bowels also readily yielded to the usual laws of their treatment, or to purgative medicines when constipated, and when affected by diarrhœa and accompanied by pain, to mild purgatives and opiates, or else to the pulvis cretæ compositus c. opio.

When the fever and other immediately alarming symptoms of the influenza had ceased, there frequently remained a teazing cough, and the convalescents in general complained of languor, want of appetite, and that their sleep was broken and unrefreshing. For removing these complaints, change of air and riding on horseback were most effectual, and to some they were absolutely necessary; and in addition to these, mild tonics, or else the natural chalybeate waters drank at the spas were of singular service.

Dietetic and Preventative Treatment.—In slight cases it was sufficient to limit the patient to white fish and puddings, and in the severer forms to slops and light puddings. The night air was universally prejudicial. It does not appear that any precautionary treatment was of service in preventing the spread of this disease among the attendants on the sick; for when four-fifths of the population were labouring under the disease, it can hardly be considered as having spread by contagion.

We must here conclude this short elementary account of the wide-spreading pestilence, and of the many other direful forms and shapes of disease, and of our imperfect means of curing or assuaging them. Death, however, produces life, and we may add—

> "Many are the ways that lead
> To his grim cave, all dismal; yet to sense
> More terrible at the entrance than within."

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* *Med. Trans.* vol. ii. p. 71.

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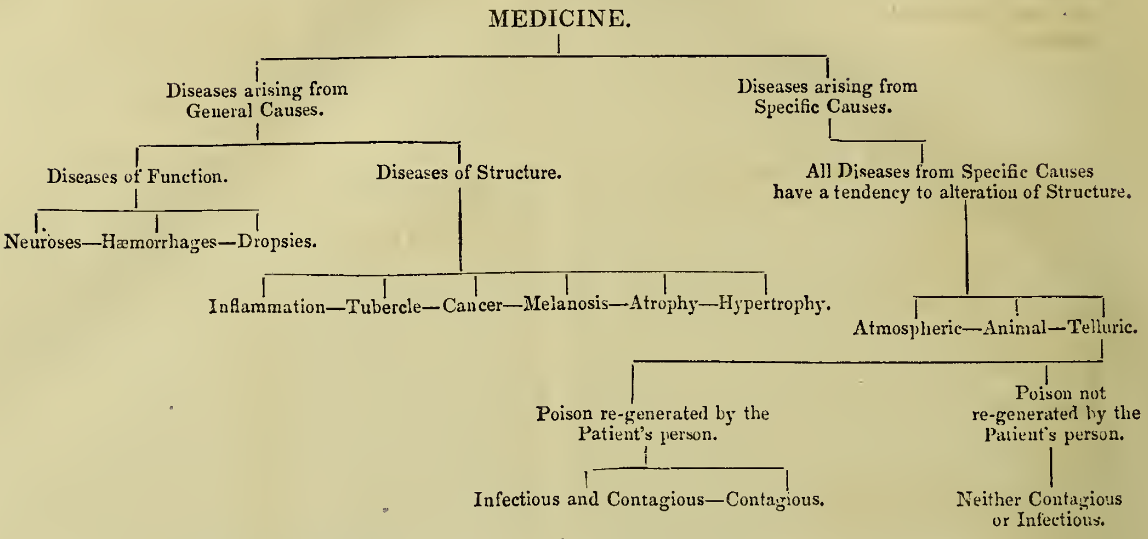
CLASSED ARRANGEMENT.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Diseases of Structure.
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